41.8
M69

AUGUST 1958

Volume 53 Number 8

U.S.L. COLL. VET. SURGEONS
11 AUG 1958
LIBRARY

nary

ine

LIBRARY
CURRENT SERIAL RECORD
JUN 25 1959
U.S. DEPARTMENT OF AGRICULTURE

FOUNDED 1905

IN THIS ISSUE

Immunization of Cattle Against Leptospirosis
Endrin Poisoning
New Lungworm Treatment for Swine
Infertility in Cattle
A Plan for Feeding Hospitalized Patients
Endotracheal Intubation of Dogs and Cats

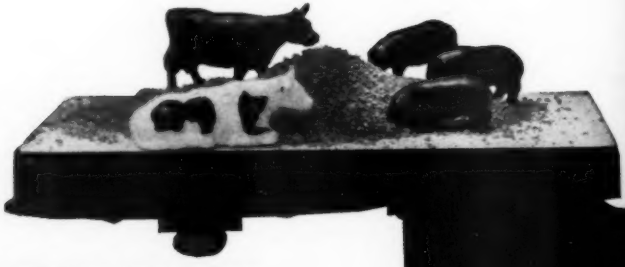
Complete Index on Page VI

CONFIRMED!
by extensive research

no other iodide gives all these plus benefits

Anti-inflammatory activity[1] . . . No depression of antibody response . . . Growth stimulating properties[2] . . . Promotion of hemaglobin formation[3] . . . Protection of vitamin potency in the ration[4] . . . Stability[5] and palatability[6] . . . Start getting *full therapeutic value* from your iodide therapy with Paladide. Order from your Jen-Sal Branch or representative today.

1. Vet. Med., 52:601-605
2. Brit. J. Nutr., 11:70-79
3. Biochem. & Physiol. Nutr., 2:439-440
4. Armour Research Foundation Report, Project No. C616
5. Ibid.
6. J. Dairy Sci., 40 (9):1087-1092

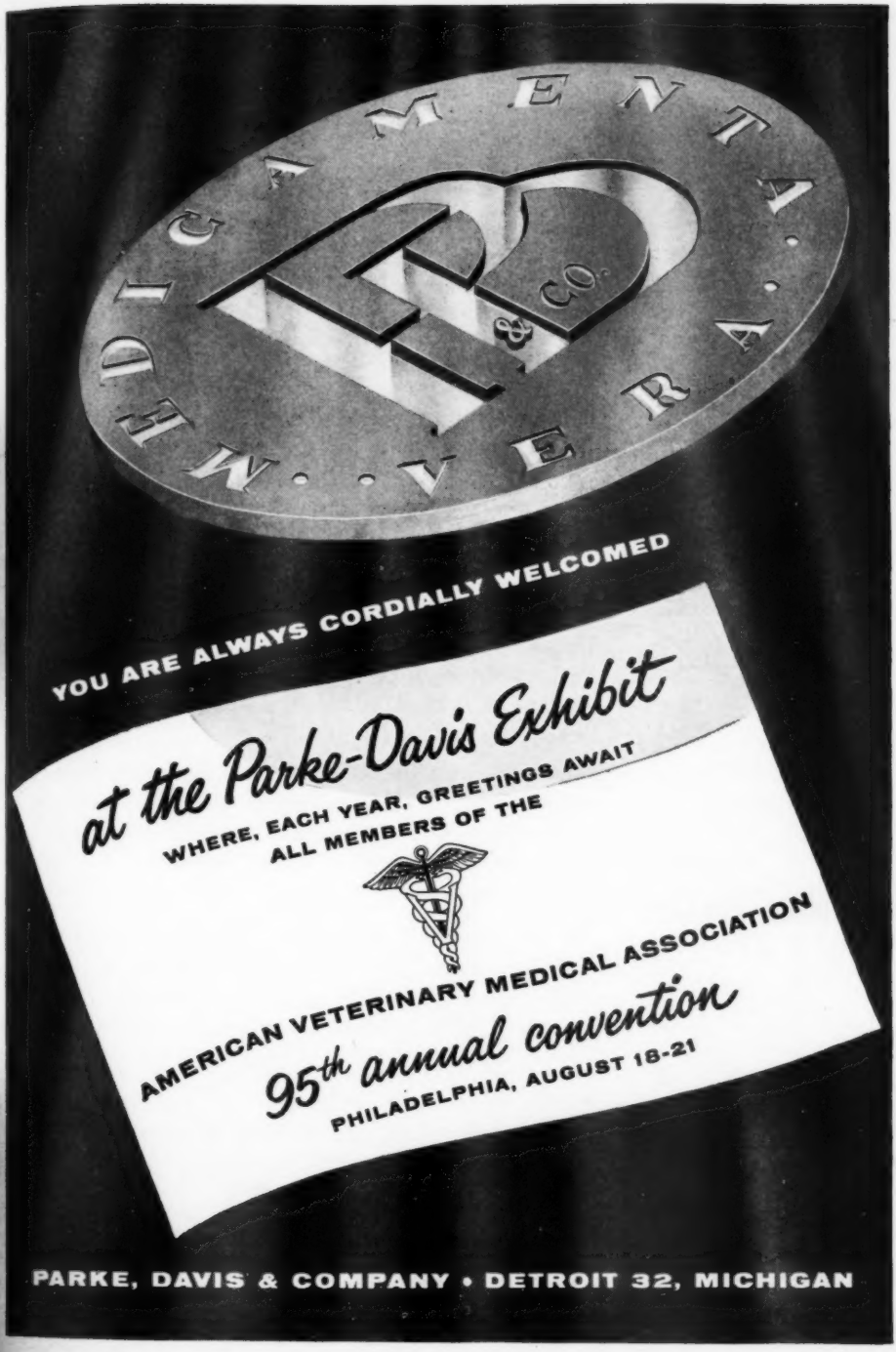


Jen-Sal

PALADIDE®

1 pound jars and economical 25 pound pails

Jensen-Salsbery Laboratories, Inc.
Kansas City, Missouri


MEDICAMENTA · VERA ·
P & CO.
YOU ARE ALWAYS CORDIALLY WELCOMED
at the Parke-Davis Exhibit
WHERE, EACH YEAR, GREETINGS AWAIT
ALL MEMBERS OF THE
AMERICAN VETERINARY MEDICAL ASSOCIATION
95th annual convention
PHILADELPHIA, AUGUST 18-21
PARKE, DAVIS & COMPANY • DETROIT 32, MICHIGAN

Published monthly at 803 Livestock Exchange Bldg., Kansas City 2, Mo. Second Class privilege authorized at Kansas City, Mo. Subscription price $5. per year.

IN MILK FEVER . . .

TO RAISE AND MAINTAIN CALCIUM LEVELS . . .

CALSEM® + PARTEROL®

Calsem-DM presents a stable solution containing calcium gluconate 20%, dextrose 20%, calcium glycerophosphate 2%, magnesium chloride 2%; in water, with stabilizer and preservative. As replacement therapy, Calsem-DM supplies an effective concentration of calcium until Parterol takes effect.

Parterol is an oil-soluble steroid which raises the blood calcium level following parturition. It acts by mobilizing calcium stored in the bones and by increasing the absorption of calcium from the intestinal tract.

One clinical study of 328 cases of milk fever showed that calcium I.V. and Parterol I.M. were effective in 98% of the patients.[1]

SUPPLIED:

Parterol in 30 cc. multi-dose vials, each cc. containing 2.5 mg. dihydrotachysterol in oil.

Calsem, *Calsem-D* and *Calsem-DM* in 500 cc. vials.

1. Harris, J.R., and Clarkson, T.B., Prevention of Relapses in Milk Fever, Vet. Medicine, *12*:696 (Dec. 1955)

Write for detailed literature.

THE S. E. MASSENGILL COMPANY

BRISTOL, TENNESSEE

NEW YORK KANSAS CITY SAN FRANCISCO

EMBRYOSTAT®

®BRAND OF OXYTETRACYCLINE

EMBRYOSTAT may be used in the uterus or the vagina as follows:

- *In utero* during breeding rest
- Intravaginally at the time of artificial insemination or natural service
- *In utero* two hours before or 2 to 72 hours after artificial insemination or natural service

EMBRYOSTAT is administered simply by attaching a syringe containing the infusion to an insemination pipette. Available in 20 cc. vials.

EMBRYOSTAT's effectiveness in combatting low-grade infection and its noninterference with the fertilizing ability of the semen help produce the results seen in this clinical summary.*

No. of Trials	*No. of Cows*	*No. of Services before Embryostat*	*% Conception with Embryostat*
1	19	3.44	80
1	16	2.25	88
1	24	3.21	80
1	124	2.00	80
4	183	2.7	82%

Pfizer

Sold only to veterinarians
Department of Veterinary Medicine
PFIZER LABORATORIES, *Division, Chas. Pfizer & Co., Inc.*, Brooklyn 6, N. Y.

*Clinical trials reported to Chas. Pfizer & Co., Inc., Terre Haute, Indiana

PUBLISHER and EDITOR
Robert L. Anderes, B.S., D.V.M.

ASS'T EDITOR and ADVERTISING MANAGER
Charles Walters, Jr., B.S., M.A.

DEPARTMENT EDITORS

Animal Health
R. R. Dykstra, D.V.M.

Nutrition
Morris Erdheim, D.V.M.

Poultry Practice
W. R. Hinshaw, D.V.M., Ph.D.

Public Health
James H. Steele, D.V.M., M.P.H.

Parasitology
A. O. Foster, B.A., M.A., Sc.D.

Clinic
Clifford L. McGinnis, D.V.M.

Practitioner's Laboratory
William L. Sippel, V.M.D., Ph.D.

Registered in U. S. Patent Office

SUBSCRIPTION RATES. ONE YEAR. $5.00; TWO YEARS. $8.75; THREE YEARS. $12.00. SINGLE COPY. 50c. U. S. FUNDS. POSTAGE PREPAID. AUTHORIZED AGENTS WILL PRESENT LETTER OF COLLECTION AUTHORITY. PAY NO MONEY TO OTHERS.

SECOND CLASS PRIVILEGES AUTHORIZED AT KANSAS CITY, MO.

ALL MATTER APPEARING IN THIS PUBLICATION IS COPYRIGHTED. NO PART OF IT MAY BE REPRODUCED WITHOUT WRITTEN PERMISSION. PERMISSION WILL BE GIVEN IF THE PURPOSE IS UNOBJECTIONABLE. IF THERE BE ANY QUESTION AS TO THE PROPRIETY OF REPRODUCTION THE AUTHOR WILL BE CONSULTED.

CHANGE OF ADDRESS: PROMPT NOTICE OF CHANGE OF ADDRESS IS REQUESTED TO ASSURE ACCURATE MAILING. GIVING OLD AND NEW ADDRESS. ADDRESS ALL COMMUNICATIONS TO VETERINARY MEDICINE. SUITE 803. LIVESTOCK EXCHANGE BLDG., KANSAS CITY 2, MISSOURI.
COPYRIGHT, 1956, BY THE VETERINARY MEDICINE PUBLISHING CO., KANSAS CITY 2, MISSOURI.

General Practice

Immunization of Cattle Against Leptospirosis 401

R. W. H. GILLESPIE, Ph.D., and S. G. KENZY, D.V.M., Ph.D.

Evaluation of available antigens suggests that a high level of disease resistance is induced by vaccination of animals over six months of age.

Endrin Poisoning: A Case Report 409

Q. R. JEROME, D.V.M.

Accidental poisoning by newly developed agricultural chemicals poses a relatively new practice problem.

New Lungworm Treatment for Swine . . 413

JOHN R. DICK, M.S., D.V.M.

Report of field trials confirms earlier reports from Great Britian of the efficacy of a new drug (cyancethydrazide) for the relief of lungworm infection in swine.

Influence of Carob Flour on Absorption and Elimination of Phenothiazine 416

M. L. COLGLAZIER, B.A., E. H. WILKENS, B.S. and F. D. ENZIE, D.V.M.

Phenothiazine-carob flour mixtures did not prevent discoloration of milk produced by treated goats in controlled experiments.

Some Principles of Client Relations . . . 421

KENNETH B. HAAS, SR., Ed.D.

Application of acceptable technics of client relations has interested practitioners aware of their importance to personal success and professional relations with the public.

Gestation Mechanisms 441

S. R. M. REYNOLDS, Ph.D., D.Sc.

The author points out that one should not think of the fetus as an entity, dependent alone on fetal circulation but of maternal organs and glands which constitute a functioning unit.

Inactivated Vaccines in the Prophylaxis of Hog Cholera 448

A. H. QUIN, D.V.M.

The author refers to experience in Europe and in this country that suggests the place of inactivated hog cholera vaccines.

Small Animal Practice

A Plan for Feeding Hospitalized Patients . 425

T. H. BRASMER, D.V.M., A. R. TWARDOCK, D.V.M., and M. F. COX, B.S.

Individual feeding of hospitalized patients is essential to success of medical and surgical treatment.

Endotracheal Intubation of Dogs and Cats 431

ROLLIN R. SMITH, D.V.M.

Auscultation 433

CHARLES R. WALLACE, B.Ch.E., D.V.M.

Canine Distemper 434

ELIJAH BOWEN, D.V.M. and ALLEN WOLFF, D.V.M.

The History of Some Current Problems in Animal Disease VII. Rabies, Part 3, (Concluding) 435

J. F. SMITHCORS, D.V.M., Ph.D.

In this the author concludes his three-section story on rabies. Despite the lessons of history, rabies continues as a fearful zoonoses problem throughout most of the world.

Editorial Comment

Salt Replacement 412
Chick Survives Head Transplant . . . 424
Employer and Employee Relations . . 440
Casualty and Income Protection Insurance 450
Symposium on Regulatory Veterinary Medicine 451
Philadelphia Convention Invitation . . 453
Methlene Blue Liver Function Test for Dogs 454
Bloat 456
Corneal Ulcers 456
Methylene Blue in Cyanide Poisoning . 456
Tranquilizers 457
A.V.M.A. Convention 458
Convention — Vacation 459
Reader's Service 462
Veterinary Calendar LII
Deaths of Veterinarians LIX

Vol. 53 August 1958 No. 8

Veterinary Medicine

A Monthly Magazine
Devoted to the Promotion of the Art and Science of Veterinary Medicine

Published Monthly by the
Veterinary Medicine Publishing Co.
Suite 803 Livestock Exchange Building
Kansas City 2, Missouri
Telephone: Victor 2-2985

Watch For

These and Other Informative Articles in Forthcoming Issues . .

FELINE INFECTIOUS ANEMIA

Robert M. Schwartzman, V.M.D. and Everett D. Besch, D.V.M.

Although research data and clinical observation leave much to conjecture, diagnosis of feline infectious anemia depends entirely on the isolation and identification of blood parasites. Parasitism, nutritional anemia, aplastic conditions, and other pathological processes must be differentiated for a definitive diagnosis.

ETIOLOGY AND POSSIBLE PREVENTIVE MEASURES IN THE DARK CUTTER SYNDROME

Harold B. Hedrick

Factors affecting the color of meat (beef) have been a matter of interest to research workers to whom the problem has been referred by slaughterers. Conclusions from observations and controlled experiments suggest that certain management factors (stress) are primarily responsible.

CHLORPROMAZINE HYDROCHLORIDE, AN AID TO THE COLLECTION OF SEMEN BY ELECTROEJACULATION

John B. Herrick, B.S., D.V.M., M.S.

The author cites experiences with the use of tranquilizers in bulls for examination of the penis. Smaller doses gave traquilizing effect yet allowed penile erection and ejaculation.

FOR
NUTRITIONAL
MANAGEMENT
OF

Urinary Diseases

The proven effective therapeutic tool in the management of diseases of mature cats. Dispensed only by graduate veterinarians.

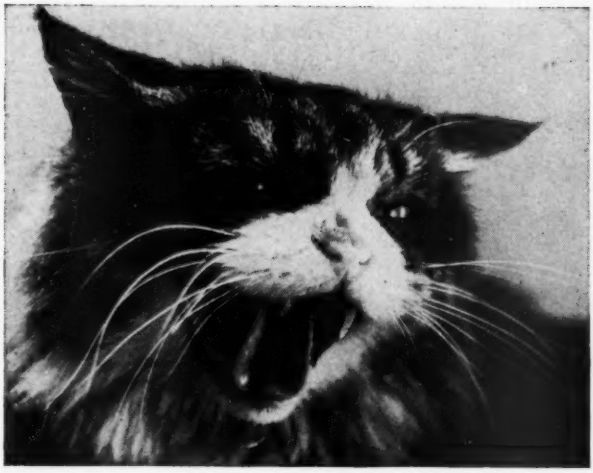
A "PRESCRIPTION DIET"

c/d

FOR FEEDING
INDIVIDUAL PATIENTS

PRESCRIPTION DIETS DEPT., HILL PACKING CO., TOPEKA, KANSAS

k/d p/d r/d i/d c/d f/d



Sparine®

HYDROCHLORIDE

Promazine Hydrochloride, Wyeth

CALMS—*safely, effectively*

SPARINE *effectively* controls nervousness, excitability, unruliness in all animals without stupefaction. It leaves the animal relaxed and manageable.

Repeated periodic administrations of SPARINE to dogs and rats for one year at the Wyeth Institute for Medical Research revealed no instances of anemia or other blood dyscrasias, jaundice, agranulocytosis, hematuria, urticaria, photophobia, or allergic dermatitis.

SPARINE simplifies diagnosis and treatment, especially in x-ray and otoscopic procedures, surgery, dentistry, and handling. It reduces struggle and the risk of injury to *both* animal and veterinarian.

AVAILABLE:

TABLETS: 25, 50, 100 mg., vials of 50.
INJECTION: 50 mg. per cc., vials of 10 and 30 cc.

SUPPLIED ONLY TO THE PROFESSIONS

Professional literature supplied on request

Wyeth®
Philadelphia 1, Pa.

Specifically for
RESISTANT INSECT CONTROL

VET-KEM BRAND INSECTICIDES

Completely New!

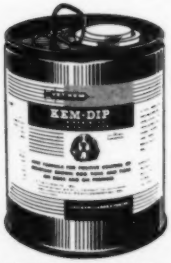
KEM-DIP

Kills resistant

Brown Dog Ticks

and Fleas

new flexible spout makes pouring easy . . .



NEW 1-gal. Lined Can.

KEM-DIP . . . based upon an **entirely new chemical** developed in the VET-KEM laboratories, gives positive control of resistant brown dog ticks.

- KILLS ENGORGED TICKS
- SPECTACULAR ON FLEAS
- LONG EFFECTIVE RESIDUAL ON BOTH DOGS AND PREMISES
- EASY, ECONOMICAL TO USE
- HAS PLEASANT ODOR

Now available commercially afte two year's development.

KEM-TOX
Livestock Dip and Spray

KEM-SPRAY
General Insecticide

KEM-SMEAR
Screw Worm Remedy

GRUB-KIL
Rotenone-BHC Grub Killer

KEM-DUST
Dog & Cat Powder

KEM-DIP
Kills Brown Dog Ticks

SOLD ONLY TO
GRADUATE VETERINARIANS
THROUGH ESTABLISHED
ETHICAL DISTRIBUTORS.

VET-KEM DISTRIBUTORS

L. A. MOSHER CO.
Atlanta, Ga., Albany, Ga.
Miami, Fla.
Memphis, Tenn.
Louisville, Ky.
Raleigh, N. C.
H. C. BURNS CO.
Oakland, Cal.
Portland, Ore.
Huntington Park, Cal.
BARBER & COCHRAN
Oklahoma City
COLUMBUS SERUM CO.
Columbus, Ohio
EDWARDS VET SUP.
Kansas City, Mo.
ELLFIELD LABS.
Riverside, Md.
FORT DODGE LABS.
Fort Dodge, Iowa
HOLMES SERUM CO.
Springfield, Ill.
LYLE A. WITTNEY, INC.
Denver, Colo.
MENCIMER VET. SUP.
Ogden, Utah
NELSON LABS.
Sioux Falls, S. D.
STEVENSON, TURNER & BOYCE, Guelph, Can.
TEXAS VET. SPEC. CO.
Austin, Texas
STANDARD VET. SUPP., New York, N. Y.

Developed and Manufactured by
VET-KEM LABORATORIES, INC.
A Division of Agricultural Specialties
10219 Denton Drive • DALLAS, TEXAS

INTRODUCING...

one of the most significant advances in livestock finishing in many years:

the SQUIBB *family of entirely new*

SYNOVEX

BALANCED HORMONE

IMPLANTS

SYNOVEX-S for STEERS

SYNOVEX-H for HEIFERS

SYNOVEX-L for LAMBS

NEW, easy-to-use implanter. No pre-slitting of skin with knife.

Do your clients finish

SQUIBB IS PROUD TO INTRODUCE **3** *entirely new*

WEIGHT GAINING

SYNOVEX IMPLANTS

SYNOVEX-S for STEERS

SYNOVEX-H for HEIFERS

SYNOVEX-L for LAMBS

- **HIGHER WEIGHT GAINS** at lower cost per lb. of gain
- **IMPROVED FEED CONVERSION** . . . more meat from every lb. of feed
- **NEW IMPLANTER** . . . speedy, easy-to-use, no pre-slitting of skin
- **FASTER TURN-OVER** . . . animals reach market weight sooner
- **SUPERIOR PHYSICAL APPEARANCE** . . . better bloom, fine finish
- **NO UNDESIRABLE SIDE EFFECTS** . . . no downgrading
- **QUALITY MEAT** . . . excellent texture, rich bright red color

The INTRODUCTION of the Squibb family of Synovex balanced hormone implants is one of the most significant advances in livestock finishing in many years. With Synovex S, H and L, you can help your clients get up to 20% more meat from every pound of feed—whether they feed steers, heifers or lambs.

The right KIND of hormones. Synovex implants contain only naturally-occurring hormones (no hormone-like chemical compounds are used). Each Synovex formula was developed for one type of animal, and contains only those hormones which stimulate maximum improvement in rate of gain and feed conversion while maintaining carcass grade.

The right RATIO of hormones. Synovex S, H and L are *balanced hormone* implants and scientifically alter metabolism and enzyme activity. Rate of gain takes a dramatic spurt upwards as the animal's hormone balance is scientifically "readjusted."

The right PHYSICAL FORM. The surface area of each Synovex implant is calculated to provide measured hormone dosage every 24 hours for the entire finishing period.

The right IMPLANTER. The Synovex all metal implanting instrument is well designed, easy to use and efficient. No pre-slitting of skin with knife is required.

The right TESTING PROGRAM. Synovex S, H and L were rigorously tested and proved at University Experiment Stations, on the farms, and in feedlots.

STEERS, HEIFERS OR LAMBS *to market weight?*

YOU CAN USE AND RECOMMEND THESE SYNOVEX BALANCED HORMONE IMPLANTS WITH CONFIDENCE

New and improved SYNOVEX-S FOR STEERS at new low price

Now the famous Synovex Steer Finishing Implants have been modified in form and formula for even better absorption and utilization of hormones and easier implanting—*at a new low price.* Steers make higher weight gains at lower cost per lb. of gain, reach market weight faster with better bloom, fine finish and quality meat. No downgrading. New implanter eliminates pre-slitting of skin.

SYNOVEX-S contains 200 mg. of progesterone and 20 mg. of estradiol benzoate. Contents of entire 1-dose cartridge (8 tiny pellets) are implanted simultaneously. Recommended for steers weighing from 400 to 1000 lbs. One implant lasts entire finishing period.

SYNOVEX-H the first and only implant FOR HEIFERS

Now, for the first time, Heifers can be *safely* implanted. Synovex-H produces dramatic improvement in rate-of-gain and feed conversion without undesirable carcass changes. Your clients get faster weight gains, better bloom, fine finish, excellent texture and quality of meat.

SYNOVEX-H contains 200 mg. of testosterone propionate and 20 mg. of estradiol benzoate. Contents of entire 1-dose cartridge (8 tiny pellets) are implanted simultaneously. Recommended for heifers weighing 400 lbs. or more. One implant lasts entire finishing period.

Another Squibb discovery SYNOVEX-L FOR LAMBS

Developed exclusively for lambs. Now you can help your clients get feeder lambs to market up to 30 days faster—without downgrading. Feed conversion improves up to 20%. Help sheepmen get the maximum profit out of the short lamb feeding period with Synovex-L!

SYNOVEX-L contains 25 mg. of progesterone and 2.5 mg. of estradiol benzoate. Contents of entire 1-dose cartridge (2 pellets) are implanted simultaneously. One implant lasts entire finishing period, from 60 to 150 days.

NEW IMPLANTER—NO PRE-SLITTING OF SKIN WITH KNIFE

You'll like this new implanter. It's easy to use, speedy and efficient for steers, heifers and lambs. No pre-slitting of skin with knife; merely insert needle point between skin and cartilage of ear and depress plunger. A strong, all-metal, precision-made instrument designed for years of reliable service. (Each single dose of Synovex S, H and L comes ready for use in a plastic cartridge which fits into hollow shank of implanter.)

SYNOVEX-S, H and L are available in **10-IMPLANT** and **100-IMPLANT** packages. For best results, feeder stock should be free from parasitism and feedlot diseases.

For additional information about **Synovex-S** **Synovex-H** **Synovex-L** write: SQUIBB, *Veterinary Department* 745 Fifth Avenue, New York 22, N. Y.

Synovex has been cooperatively developed by E. R. Squibb and Sons and The Syntex Group. "Synovex" is a Squibb trademark.

SQUIBB—A NAME YOU CAN TRUST

© OLIN MATHIESON CHEMICAL CORPORATION, 1958

Stop and see our Centennial Display at booth numbers 86 and 87 at the A.V.M.A. meeting in Philadelphia

You can get

SYNOVEX-S

SYNOVEX-H

SYNOVEX-L

from any of the veterinary supply houses listed below or your nearest Squibb Branch.

ALABAMA
Shoals Whise. Veterinary Supply Co., Florence

ARIZONA
Arizona Veterinary Supply Inc., Mesa

CALIFORNIA
H. C. Burns Co., Inc., Oakland
H. C. Burns Co., Inc, Los Angeles
California Medical Supply Co., Pasadena
California Veterinary Supply Co., Los Angeles
Central City Chemical Co. Consolidated, San Francisco
Sharpe & Vejar Co., Los Angeles
United Veterinary Corporation, Modesto
Valley Veterinary Supply Co., N. Hollywood

COLORADO
Rocky Mountain Veterinary Supply, Inc., Denver

DISTRICT OF COLUMBIA
District Veterinary Products Co., Washington

FLORIDA
Paul Dant & Co., Inc., Miami Springs
L. A. Mosher, Inc., Miami

GEORGIA
Albany Serum Co., Albany
L. A. Mosher, Inc., Atlanta
L. A. Mosher, Inc., Albany
Southern Veterinary Supply Co., Rome

IDAHO
Snake River Valley Serum Co., Boise

ILLINOIS
Chicago Veterinary Supply, Inc., Chicago
Corn Belt Laboratories, Inc., E. St. Louis
Holmes Serum Co., Springfield
Swingley Veterinary Supply Co., Freeport

INDIANA
Columbus Serum Co., Indianapolis
Missouri Valley Serum Co., Evansville

IOWA
Central Veterinary Supply Co., Des Moines
Missouri Valley Serum Co., Cedar Rapids

KANSAS
Missouri Valley Serum Co., Kansas City

KENTUCKY
L. A. Mosher, Inc., Louisville

LOUISIANA
Veterinary Supply Co., Inc., New Orleans

MARYLAND
A. J. Buck & Sons, Baltimore

MASSACHUSETTS
Jack Webster, Jr., Wakefield
David Yellen Co., Inc., Stoughton

MICHIGAN
Detroit Veterinary Supply Co., Detroit

MINNESOTA
Northland Veterinary Supply, St. Paul

MISSISSIPPI
Charles Horne Veterinary Supply Co., Newton

MISSOURI
Edwards Veterinary Supply Co., Kansas City
Ru-Vita Corporation, Kansas City

NEBRASKA
Blue Cross Serum Co., Superior
Grain Belt Supply Co., Omaha

NEW MEXICO
Great Western Serum, Albuquerque

NEW YORK
Gertrude DeVine Veterinary Supplies, Goshen
Essential Mineral Products Co., Batavia
Ethical Veterinary Supply Co., Long Island City
Farma-Ceuticals Company, East Homer
Lawler's Veterinary Supply Co., Carthage
Pennsylvania Veterinary Supply, Utica
Vetromart Co., Syracuse

NORTH CAROLINA
Barber Veterinary Supply, Fayette
L. A. Mosher, Inc., Raleigh

OHIO
W. A. Butler Company, Columbus
Columbus Serum Co., Inc., Columbus
P-T Veterinary Supply Co., Cincinnati
Zehr & Company, Pettisville

OKLAHOMA
Barber & Cochran Veterinary Supply Co., Oklahoma City

OREGON
H. C. Burns Co., Portland
Northwest Veterinary Supply Co., Oregon City
Portland Veterinary Supply Co., Portland

PENNSYLVANIA
Frank E. Lentz Co., Philadelphia
Pennsylvania Veterinary Supply, Harrisburg

SOUTH DAKOTA
Nelson Laboratories, Sioux Falls

TENNESSEE
L. A. Mosher, Inc., Memphis

TEXAS
Miller Veterinary Supply Co., Ft. Worth
So. Texas Veterinary Supply Co., San Antonio

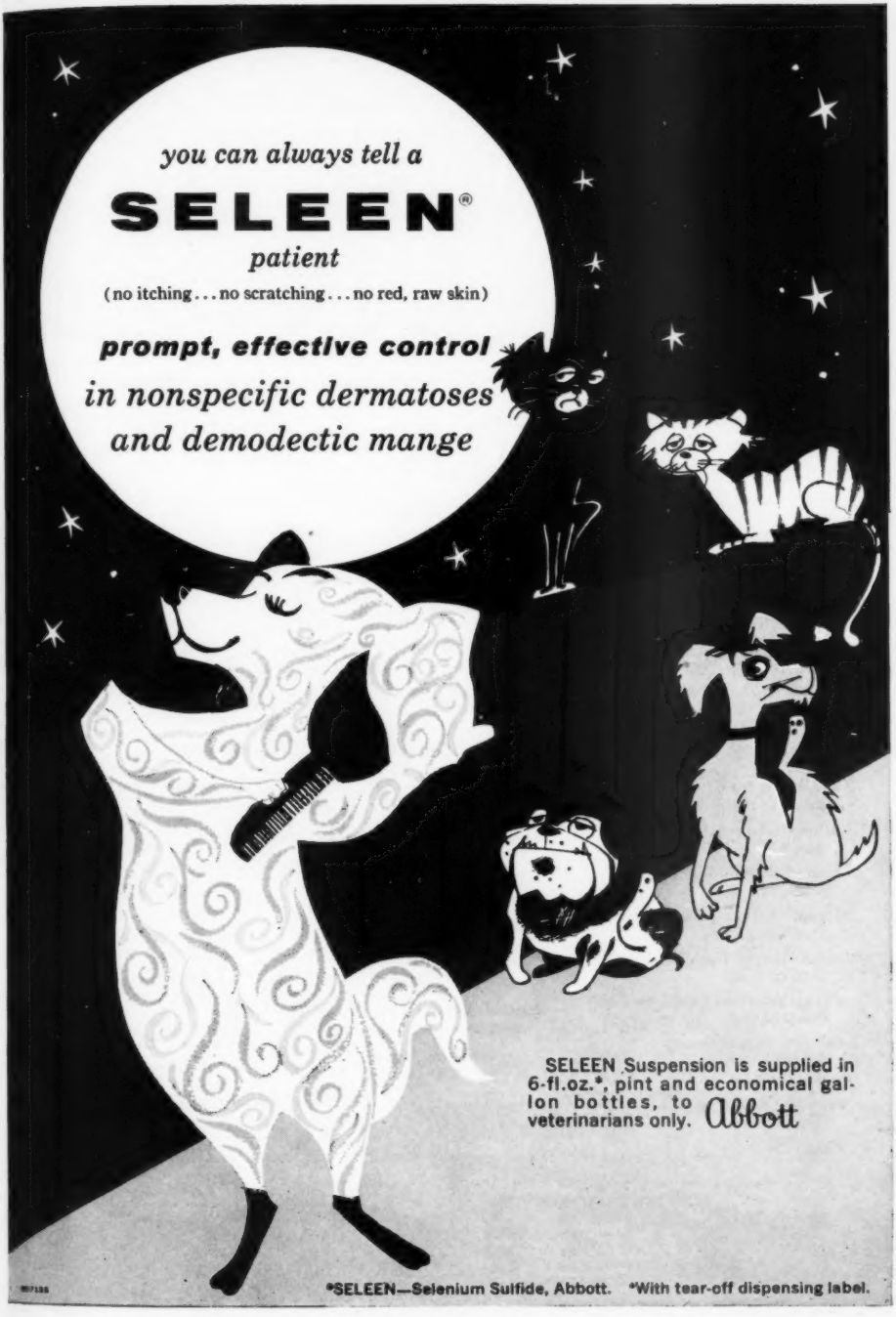
UTAH
Mencimer Veterinary Supply Co., Ogden

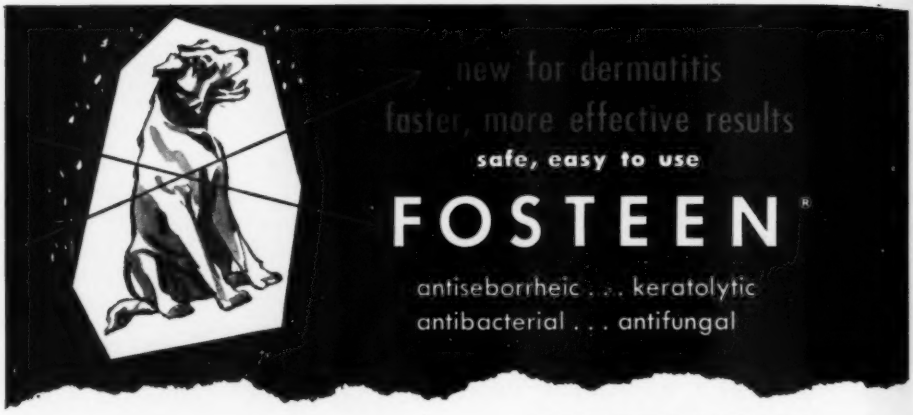
VIRGINIA
Barber Veterinary Supply Co., Inc., Richmond

WASHINGTON
Cummings Medical Supply Co., Seattle
Northwest Veterinary Supply Co., Seattle

WISCONSIN
Wisconsin Biological Laboratories, Madison

TERRITORY OF HAWAII
Farm & Home Supply, Honolulu


you can always tell a
SELEEN®
patient
(no itching . . . no scratching . . . no red, raw skin)
prompt, effective control
in nonspecific dermatoses
and demodectic mange
SELEEN Suspension is supplied in 6-fl.oz.*, pint and economical gallon bottles, to veterinarians only. Abbott
*SELEEN—Selenium Sulfide, Abbott. *With tear-off dispensing label.



Use as a therapeutic shampoo in eczemas, seborrheic dermatitis, scaly skin, otitis externa, nonspecific dermatitis, demodectic mange, fungus infections.

***Available** in 4.5 oz. and 3 lb. jars.*

Clinical results in 592 dogs

Condition	Total Number	Good to Excellent Results
Weeping dermatitis ("Moist Eczema")	217	200-(92%)
Dry dermatitis ("Summer Eczema")	238	190-(80%)
Seborrheic dermatitis (including otitis externa)	137	127-(93%)

The effectiveness of FOSTEEN is provided by Sebulytic® (dioctyl sulfosuccinate, alkyl aryl polyether sulfonate and lauryl sulfoacetate) a new combination of surface active cleansing, penetrating and wetting agents with remarkable *antiseborrheic, keratolytic, antibacterial* and *antifungal* action—enhanced by sulfur 2%, salicylic acid 2% and hexachlorophene 1%.

order FOSTEEN from these distributors

A. J. Buck & Son
Baltimore 13, Md.

Arizona Veterinary Supply Co., Inc.
Mesa, Ariz.

Barber Veterinary Supply Co., Inc.
Richmond 20, Va.

Central City Chemical Consolidated
San Francisco 5, Calif.

Central Surgical Supply Co.
Fitchburg, Mass.

Chicago Veterinary Supply, Inc.
Chicago 18, Ill.

Columbus Serum Company
Columbus 7, Ohio
Indianapolis, Ind.

Edwards Veterinary Supply Co.
Kansas City 8, Mo.

Frank E. Lentz Co.
Philadelphia 4, Pa.

Gertrude Devine Veterinary Supplies
Goshen, N. Y.

Holmes Serum Company
Springfield, Ill.

L. A. Mosher Co.
Atlanta, Ga. — Louisville, Ky.
Albany, Ga. — Raleigh, N.C.
Miami, Fla. — Memphis, Tenn.

Meacimer Veterinary Supply
Ogden, Utah

Miller Veterinary Supply Co.
Fort Worth 4, Tex.

Nelson Laboratories
Sioux Falls, S.D.

Northland Veterinary Supply Co.
St. Paul 4, Minn.

Northwest Veterinary Supply Co.
Oregon City, Ore.
Seattle, Wash.

Pioneer Laboratories
Houston, Tex.

Sharpe & Vejar Company
Los Angeles 64, Calif.

Standard Veterinary Products Co.
New York 1, N.Y.

Wisconsin Biological Supply Co.
Madison 3, Wis.

H. C. Burns Co., Inc.
Oakland, Calif.
Huntington Park, Calif.
Portland, Ore.

Write for clinical reprint and samples. Available only to the profession.

Westwood PHARMACEUTICALS
Division of Foster-Milburn Co. · 468 Dewitt Street, Buffalo 13, New York

These Therapeutic Nutritional Advances in Small Animal Medicine . . .

Rx Diets

FOR DOGS AND CATS

INDICATIONS

ATLAS Rx (for dogs)

. . . For genitourinary diseases, especially nephritis, and senility

ATLAS Rx (for dogs)

. . . Useful where a high protein diet is indicated

ATLAS Rx (for dogs)

. . . For gastrointestinal disturbances, especially diarrhea

ATLAS Rx (for dogs)

. . . To reduce overweight dogs and cats

ATLAS Rx (for cats)

. . . For cats with the urethritis-cystitis-calculi syndrome

SOLD ONLY TO THE VETERINARY PROFESSION

Prepared by the Special Diets Department of

GLENDALE 27, NEW YORK

Tested and Recommended as a Result of Clinical and Laboratory Research.

Special Diets Dept., Atlas Canine Products, Inc.
Glendale 27, New York VM-858

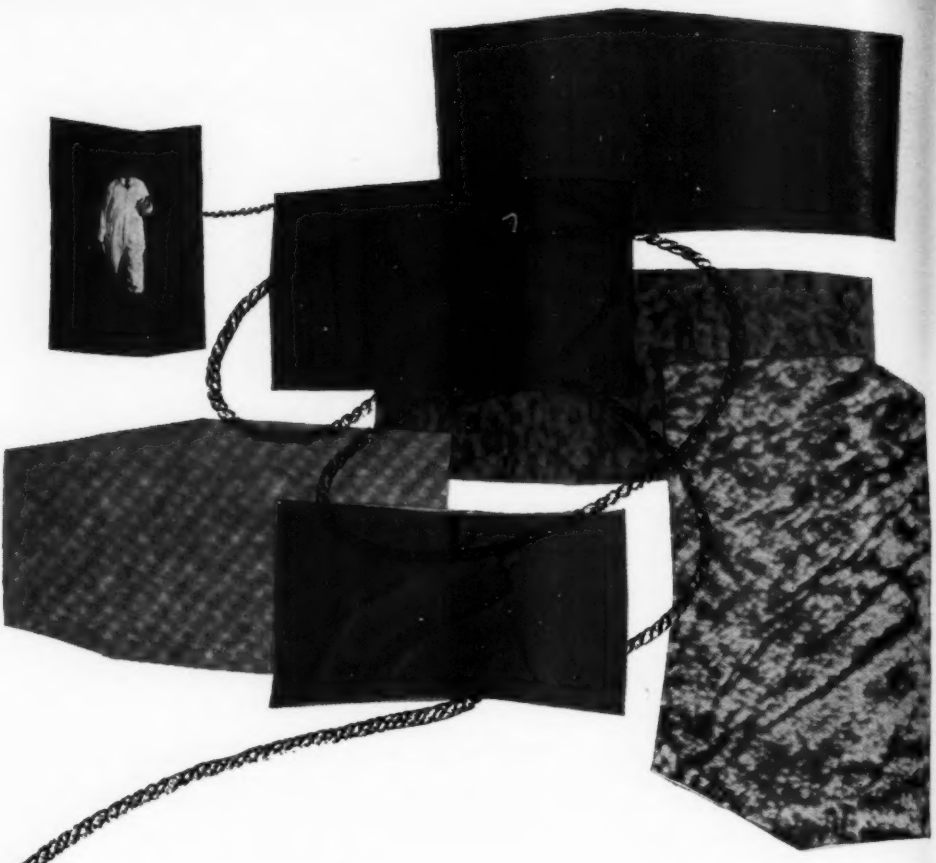
Gentlemen:

Please send price list and professional literature on Atlas Rx Diets for dogs and cats.

Dr._____

Street_____

City_____ State_____



Don't break the line

The livestock industry has made great strides in recent years, reaching new heights in production efficiency through better disease control.

The veterinarian and his ethical supplier have spearheaded the team that has contributed so much to this progress. For many years, they have been held together by mutual faith and dependence one on the other.

Certain suppliers in an attempt to boost sales carry water on both shoulders. They sell to veterinarians on the one hand while at the same time encourage the use of veterinary products by laymen. Should this tendency to by-pass the veterinarian continue, could it not become a serious obstacle to further progress in animal disease control?

This could, in effect, break the link that holds the team together, besides ultimately strangling the local veterinarian's practice.

Let's keep this all-important life line intact. Your confidence in us, and support of our principles, will help in doing the job.

Affiliated

AFFILIATED LABORATORIES CORPORATION

WHITE HALL, ILLINOIS

Grain Belt Supply Co. — The National Laboratories Corp.

Corn Belt Laboratories, Inc. — The Gregory Laboratory, Inc.

PRODUCED FOR AND SOLD TO GRADUATE VETERINARIANS ONL

News Comment

Legal Sale of Drugs

The New Jersey legislature is reported to be considering legislation that would make it illegal for anyone other than licensed pharmacists and veterinarians to sell drugs and medicaments used commonly for the prevention and treatment of animal and poultry diseases.

Thyroprotein for Increased Milk Yield

USDA research report suggests that increased milk yields are possible in some cows for limited periods when extra grain and thyroprotein are supplied. Total milk production per lactation of treated and untreated cows were approximately equal.

Deterrent to Pork Consumption

Excessive fat is given as the major objection to pork. Disposable income (dollars after taxes) spent for pork has declined from 3.1% in 1948 to 1.7% in 1958.

Grub Control

Efficiency of systemic agents for cattle grub control is being demonstrated by consistent daily gains in treated animals and reduced incidence of grub damaged hides. One recent test with 453 heifers indicated treatment added $5.71 in value per head.

Grass Juice

Grass juice for young calves proved to be growth stimulating in Kansas experiments. Researcher E. E. Bartley thinks that grass juice may be a marketable commodity for the future.

Small Litters

Aside from faulty sow conformation, South African workers point out that small litters of pigs may be due to faulty mating, e.g., too early or too late mating during estrum, overwork of the boar (especially of a young one), or the use of a partially infertile boar.

Four-way Vaccine

A product trademarked Quadrigen, not yet available for commercial distribution, has been developed by Parke, Davis & Company that combines antigenic agents of four diseases—

poliomyelitis, diphtheria, whooping cough, and tetanus. Designed to immunize children, it is reported that successful tests have been completed on 300 Detroit youngsters.

Tranquilizers for Beef Cattle

Parenteral tranquilizers for cattle are being marketed exclusively through veterinarians. Increase in their use appears inevitable as data accumulate suggesting good results in limiting losses due to shipping fever, and other infectious diseases, common to feeder cattle. It is also claimed that shrinkage due to various stress factors incident to shipping and changing of environment, feed and water is lessened.

Antiviral Agents

Reporting at the Royal Society Fellows in London, England, two physicians expressed hope that an unexpected natural product of living cells they have named Interferon might eventually prove a valuable therapeutic agent for the treatment of virus diseases.

Though not isolated in pure form, Interferon is known to be a protein product which interferes with multiplication of the viruses without harm to cells invaded.

"Horizontal Cooperation"

Another term descriptive of new phases of "agribusiness" is horizontal cooperation. The Purina Mills, St. Louis, built and equipped the Douglas Fresh Egg Co. in Douglas, Ga. to service producer-units of Purina feeds. The establishment is leased outright to Armour & Co.

Equine Encephalomyelitis

Equine encephalomyelitis and related encephalitides continue to take an annual toll. Animal Eradication Division of the USDA reports the number of animals affected in 1957 as 1,525 with deaths totaling 639.

Although annual incidence has varied materially during the past ten years, that reported for 1948 (1,796 affected—635 deaths) approximates the past year's experience.

Considering reports of virus isolation in species other than equine, sources of infection do exist carrying over infective virus from season to season.

Pigloo System

Igloo-like houses for pigs, complete with exercise pen, have been developed by Nutrena Mills and are expected to reduce disease and death loss. The house is designed as an individual maternity ward for the sow and piglets. Sows can not crush infant pigs while nursing. In effect the new unit provides an isolation ward. As a result the usual livestock diseases that affect the newborn are virtually eliminated. The new management system itself is characterized by its adaptation of known principles of antibody protection, natural birth and physical protection for young pigs.

For Problem Dogs

Equanil®

Meprobamate, Wyeth

calms the vicious patient

EQUANIL relieves tension, agitation, anxiety—safely in dogs and other small animals.

Hyperexcitability, hysteria, nervousness, unruliness, and shyness are effectively controlled by EQUANIL. The action is prolonged, uniform, and essentially free of by-effects.

With EQUANIL, your ability to handle excitable patients is greatly enhanced. And office quietude is assured by previsit medication.

AVAILABLE: Tablets, 200 and 400 mg., bottles of 50.

Wyeth®
Philadelphia 1, Pa.

SUPPLIED ONLY TO THE PROFESSIONS

Professional literature is available on request

to control these topical infections

ringworm, fungus infections
eczema, hot spots
acute erythematous and moist dermatitis
otitis externa
minor cuts and wounds
paronychia, balanitis
pyogenic infections

choose the form you prefer

Triocil

TRADEMARK — BRAND OF HEXETIDINE

SPRAY / SOLUTION / OINTMENT

Whichever form you use on small and large animals, you can count on these outstanding Triocil properties: broad-spectrum activity . . . no development of resistant bacterial strains . . . prolonged tissue affinity that defies licking and rubbing off.

New **Triocil Spray.** Apply to irritated or inflamed areas without disturbing tissue. Bactericidal, fungicidal, easy-to-use. Dispense to clients for assurance of continuous therapy. For pre-surgical preparation, too.

Use **Triocil Ointment** for topical infections confined to smaller or separated areas. **Triocil Solution,** in a shampoo-like detergent base, is best for generalized infections and as prophylaxis against recurrence.

Paxital TRADEMARK
mepazine
aids in controlling symptoms of canine chorea

Anabolin TRADEMARK
metabolic regulator
adjunctive therapy for dermatologic problems

DIVISION OF VETERINARY MEDICINE
WARNER-CHILCOTT
MORRIS PLAINS, NEW JERSEY

products for the profession—available only through veterinary distributors

Promazine produces general tractability in all species

this effective, safe,

injectable ataraxic exerts

a profound calming action

. . . allays stress and acute

nervous system excitation . . .

. . . reduces rebellion

Recommended dosage: For large animals: 0.5 to 1 mg. per lb. bodyweight; for small animals, 0.2 to 0.5 mg. per lb.
Onset of tranquilization: In large animals, usually 10–15 minutes intravenously, or 25–40 minutes, intramuscularly; in dogs, usually 5 minutes, intravenously, or 20–30 minutes intramuscularly. Duration of action varies with dosage, but usually lies within a range of 4 to 6 hours.

Promazine
HYDROCHLORIDE

30 cc. vial, 50 mg. per cc.

FORT DODGE

Fort Dodge Laboratories, Inc., Fort Dodge, Iowa.

The five steroid preparations

Product	Indications
HYDELTRONE* **TABLETS** Your *small-animal* corticosteroid	**Small animals** Inflammatory joint and skin diseases, trauma, burns, shock, surgery
HYDELTRONE **T.B.A. SUSPENSION** Your *all-purpose* corticosteroid	**Small animals** **Arthritis,** inflammatory joint and skin diseases **Large animals** **Ketosis,** stress (including fulminating infections and retained placenta)
HYDELTRONE **0.5% OPHTHALMIC SOLUTION** **HYDELTRONE** **0.25% OPHTHALMIC OINTMENT** Your *ophthalmic* corticosteroid-antibiotic combinations	**Ocular inflammation or infection** in conjunctiva or anterior segment of eye
HYDROBIOTIC* **TOPICAL OINTMENT** Your corticosteroid-antibiotic combination	**Topical application** in dermatologic conditions (skin, nose, ear); summer eczema, otitis externa; antibacterial and anti-inflammatory dressings

Sold to veterinarians only

TRADEMARKS OF MERCK & CO., INC. FOR PREDNISOLONE AND HYDROCORTONE–NEOMYCIN–BACITRACIN OINTMENT RESPECTIVELY

specifically indicated throughout your practice

Composition	Dosage Schedule
Compressed 2.5 mg. Tablets. Compressed 5 mg. Tablets. In bottles of 100	From 2.5 mg. b.i.d. to 5 mg. q.i.d. until response is obtained, depending on severity of condition and size of animal. Reduce to amount just sufficient to maintain remission.
Rubber-capped vials containing 5 cc. of a 20 mg./cc. Saline Suspension	**Arthritis and other inflammation of joints** Horses, 50-100 mg. (2.5-5 cc.); small animals, 10-20 mg. (0.5-1.0 cc.) *intrasynovially* in carpal, coxofemoral or tarsal joint. Other joints and bursae according to size **Ketosis,** skin disease and stress: Horses and cattle, 100-300 mg.; small animals, 1 mg./5 lb. intramuscularly (dogs, about 20-50 mg.)
Aluminum-sealed dropper bottles of 5 cc. Each cc. contains: 5.0 mg. of prednisolone 21-phosphate 5.0 mg. of neomycin sulfate (equivalent to 3.5 mg. neomycin base).	**Solution** 2 or 3 drops in the lower conjunctival sac three or four times a day.
Tubes of 3.5 Gm. Each gram of ointment contains: 2.5 mg. prednisolone 21-phosphate 5 mg. neomycin sulfate.	**Ointment** Apply a small quantity inside the lower lid three times a day.
Tubes of 5 Gm. Each Gm. of ointment contains: 25 mg. of hydrocortisone 5 mg. neomycin sulfate 1,000 units of zinc bacitracin	**Topically:** Two or three applications daily

VETERINARY

MERCK & CO., INC.
CHEMICAL DIVISION
RAHWAY, NEW JERSEY

MERCK & CO., INC.

new "far superior" treatment for retained placenta

Therapeutic failure, frequently encountered in retained placenta, can be prevented—with new FUREA Veterinary which combines the potent wide-range bactericidal and deodorizing action of FURACIN® (brand of nitrofurazone) with the cleansing action of urea. FUREA Veterinary boluses disintegrate readily and are nonirritating and nontoxic.

In retained placenta, treatment with FUREA has produced quick improvement of the general condition of the cow with lessening or elimination of malodor. Fertility rate remained unimpaired in over 90% of treated cows.*

SUPPLIED: Each bolus contains 0.12 grams of FURACIN and 12 grams urea. Bottle of 25.

DOSE: Two boluses inserted into the recently pregnant horn. One bolus may be placed in the non-pregnant horn.

*Jones, S. V.; Belloff, G. B., and Roberts, H. D. B.: Vet. Med. 51:413 (Sept.) 1956.

For vaginal infections, including those caused by Vibrio fetus, that may prevent conception, or cause abortion, dispense: FURACIN Suppositories Veterinary, large. Box of 12.

FUREA T.M.
VETERINARY

AVAILABLE THROUGH YOUR PROFESSIONAL VETERINARY DISTRIBUTOR

EATON LABORATORIES, NORWICH, NEW YORK

new specific treatment for calf scours

Developed specifically for the control of calf scours, new ENTEFUR provides rapid, effective and safe treatment. ENTEFUR drastically cuts mortality.[1,2] In one study, 60 of 63 ENTEFUR-treated calves survived, whereas in the control group only 3 of 24 calves lived.[2] "ENTEFUR treatment appeared the only factor modifying significantly the course and outcome of the disease."[2]

ENTEFUR contains the new nitrofuran, Furamazone® (brand of nifuraldezone) for rapid wide-spectrum bactericidal action against gram-positive and gram-negative enteric bacteria. ENTEFUR also contains bismuth subsalicylate for its mildly astringent, antidiarrheal action.

ENTEFUR BOLUS VETERINARY, small, contains: Furamazone 1 Gm., bismuth subsalicylate 0.26 Gm. Dosage: 1 bolus twice a day for 2 days. Supplied: Box of 24 (6 envelopes of 4 boluses each).

REFERENCES: 1. Bull, W. S.: N. Amer. Vet., In press. 2. Henry, R. T., and Blackburn, E. G.: Vet. Med., In press.

ENTEFUR™

NOW AVAILABLE THROUGH YOUR PROFESSIONAL VETERINARY DISTRIBUTOR

EATON LABORATORIES, NORWICH, NEW YORK

FOR ALL INFLAMMATIONS...

VARIZYME®

STREPTOKINASE-HUMAN PLASMINOGEN-STREPTODORNASE

SPEEDS RECOVERY

Parenterally, VARIZYME speeds recovery by removing the *disease barrier* to freely admit oxygen, humoral agents and antibiotics into the diseased area.

By enzymatic action VARIZYME liquefies fibrin, clotted blood and viscous exudates. Use VARIZYME to reverse the inflammatory process and remove the disease barrier.

Topically, VARIZYME liquefies pus and caseous material as well as fibrin and clotted blood.

For the reduction of *any* inflammation—large or small animal—make the use of VARIZYME therapy your first procedural step.

Always accompany parenteral VARIZYME therapy with systemic antibiotic therapy. Preferably use POLYOTIC® Tetracycline.

Sold to veterinarians only.
Write for detailed information.

VARIZYME
Case History

Animal: Jersey cow, 800 pounds.
Diagnosis: Phlebitis, cellulitis and abscess formation in jugular furrow following treatment for milk fever.
Treatment: VARIZYME 125,000 units injected into and around affected tissues plus systemic antibiotic therapy.
Remarks: Improvement within 72 hours. Small scar tissue mass remains. No sloughing, hemorrhage or disfigurement. Results very gratifying to owner.

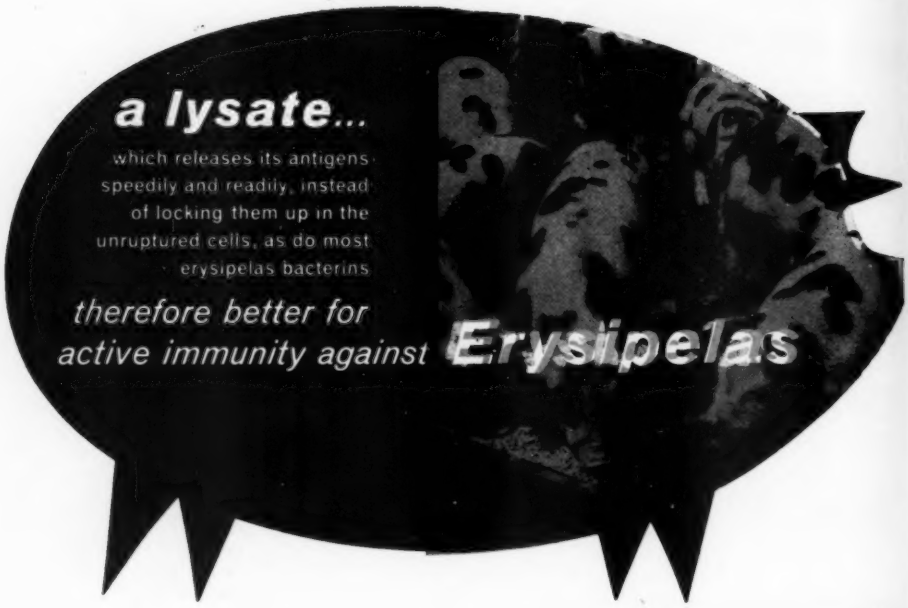
VARIZYME
Case History

Animal: Holstein cow, 1000 pounds.
Diagnosis: Acute mastitis, one quarter.
Duration: 3 days.
Treatment: VARIZYME 125,000 units, intravenously with POLYOTIC Tetracycline.
Remarks: Clinical improvement 48 hours. Complete recovery in 5 days.

CYANAMID

PRODUCTS FOR TODAY—RESEARCH FOR TOMORROW

VETERINARY PROFESSIONAL SERVICE DEPARTMENT
AMERICAN CYANAMID COMPANY, NEW YORK 20, N. Y.


a lysate...
which releases its antigens speedily and readily, instead of locking them up in the unruptured cells, as do most erysipelas bacterins
therefore better for active immunity against Erysipelas

RHUSIGEN*

With Rhusigen, the use of live culture is avoided and premises cannot be infected.

A 2 cc. dose is used instead of the 5 cc. required by other bacterins. Immunity is produced within two weeks, and persists for at least eight months, possibly longer.

Rhusigen can be used simultaneously with anti-swine-erysipelas serum, when immediate protection is needed.

20 cc. vial (10 doses) code: Baryp

100 cc. vial (50 doses) code: Balum

PITMAN-MOORE CO., DIVISION OF

ALLIED LABORATORIES, INC.
Indianapolis 6, Indiana

*Trademark name for Erysipelas Bacterin (Lysate) P-M Co. Bio. 914. Produced under license from the Institut Merieux, Lyon, France. (Patent Pending)

ROYAL COLL. VET. SURGEONS
11 AUG 1958
LIBRARY

Extensive and critical research on leptospirosis has been pursued by the authors for years. This is the first of a three-part report summarizing work that has revealed features of practical interest to veterinarians concerning vaccination of susceptible animals.

Immunization of Cattle Against Leptospirosis

I. Comparative Evaluation of Leptospira pomona Bacterins

R. W. H. GILLESPIE, Ph.D. and S. G. KENZY, D.V.M., Ph.D.

Pullman, Washington

EXPERIENCE in practical application and controlled field trials[1,2] indicates that *Leptospira pomona* bacterins may prove effective in limiting the spread of leptospirosis. Several publications show that bacterins[3,4,5] and a soluble antigen derived from cultures of the organism[6] produce immunity. Living, egg-adapted (avirulent) *L. pomona* is reported to produce resistance persisting for at least 17 months.[7] It appears, however, that experimental verifications of the value of such products is limited and that additional information regarding the duration of immunity induced by vaccination is needed. Furthermore, the possibility that vaccination may reduce the severity of the disease (in animals that fail to become fully resistant) with a consequent reduction in "shedding" has received little attention. The purpose of this study was (1) to compare the relative degrees of resistance induced by different bacterins, (2) to determine the duration of immunity and (3) to determine at what age vaccination first becomes effective.

From the Washington Agricultural Experiment Station, Department of Veterinary Science and Department of Veterinary Microbiology, College of Veterinary Medicine, State College of Washington, Pullman. Scientific Paper No. 1544.

Materials and Methods

Animals. To obtain such information a total of 69 cattle were vaccinated, using three different products. Because of anticipated differences in response to the bacterin at different ages, three age groups were included: 36 heifers about six to eight months of age; 18 calves estimated to be one to two months of age; and 15 calves three to five months of age. Table 1 shows the distribution of the vaccinated animals by age and by vaccine groups.

The results of challenge of 12 of the 36 heifers and all of the one- to two-month-old calves listed in table 1 are presented in this report. The remaining cattle were held for challenge at intervals up to 20 months after vaccination. Additional findings will be reported later.

The heifers, predominantly Herefords, were from herds found before purchase to be free of *L. pomona* agglutinins. They were selected on the basis of age, condition and apparent freedom from other diseases. All were negative to tuberculin and brucellosis tests. Both blood and urine samples proved free of agglutinins against the test strain of *L. pomona*. Tests performed after a month or more in isolation continued to be negative.

The calves were purchased through a local stock buyer. They also were selected on the basis of age and apparent freedom from disease. The calves, with one exception,† tested free of agglutinins against *L. pomona* when purchased.

The controls, with few exceptions, were in the same age ranges as the vaccinated animals and they were usually purchased at the same time. They, too, were always tested, quarantined and retested before use.

During the interval between vaccination and exposure, the vaccinated and control cattle were quarantined in a Cyclone-fenced area. The area was well drained and was located on high ground that was not subject to contamination by other domestic animals.

Bacterins. For comparative purposes, three bacterins were employed. One (no. 1) was a commercial product (Leptogen — Pitman-Moore). The other two were experimental bacterins. One of the latter (no. 2) was prepared for our use by a biological supply company.* It was an Aureomycin-killed culture bacterin. Products no. 1 and 2 were lyophilized. They were held at 5 C. and reconstituted before use. The third bacterin, produced in our laboratory, was prepared from pooled cultures of recently isolated strains. The leptospires were killed by the addition of formalin to 0.2% final concentration. This product was then stored at -20 C. until employed in the vaccination trials. Each animal (with the exception of five of the 15 calves still under study) received a single 5.0 ml. dose of bacterin administered subcutaneously, anterior to the scapula.

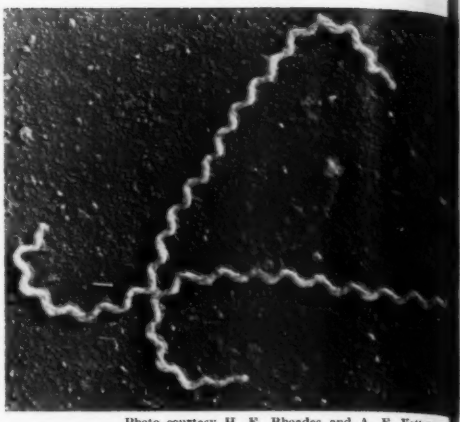


Photo courtesy H. E. Rhoades and A. E. Vatter.

Two *Leptospira pomona* organisms as seen with the electron microscope, magnified approximately 9,000 times. Note the closely-spiralled, cylindrical organisms with hooked ends.

†This calf (#51) showed a low titer (10^{-2}), presumably acquired passively through the colostrum, for it soon disappeared. The animal became infected on challenge about nine months after purchase, which seems to fully justify its inclusion with the group.

*Veterinary Clinical Research Division, American Cyanamid Company, Pearl River, N. Y.

TABLE 1. Vaccination Schedule

No. cattle	Age when vaccinated (months)	Bacterin*	Vaccination date
15 Heifers	6-8	No. 1 (Com.)	3/4/54
15 Heifers	6-8	No. 2 (Com.)	4/15/54 (10); 5/13/54 (5)
6 Heifers	6-8	WSC (Exper.)	3/4/54
8 Calves	1-2	No. 1 (Com.)	5/6/54 (4); 5/19/54 (4)
10 Calves**	1-2	No. 2 (Com.)	5/6/54 (5); 5/19/54 (5)
5 Calves	3-5	No. 1 (Com.)	4/6/55
5 Calves**	3-5	WSC (Exper.)	4/15/55
5 Calves†	3-4	No. 1 (Com.)	11/12 and 12/10/55

*All products were killed suspension of *L. pomona*.
**One calf in each of these groups died before challenge of causes not associated with vaccination.
†These 5 calves received two doses of bacterin, 4 weeks apart (all the others received only one, 5.0 ml. dose).

Strain of L. pomona used for Challenge. This strain (REA strain) was originally isolated from the urine of an infected heifer calf during field studies of November 1953. Attention was drawn to infection in this herd by a number of deaths in young stock, with symptoms and autopsy findings strongly suggesting leptospirosis. Tentative diagnosis was confirmed by official blood tests and by demonstration of leptospires in the urine of about 10% of the animals examined. This strain was chosen for our experimental program because of its apparent virulence. The strain was isolated from the calf's urine by guinea-pig inoculation and later cultured from the peritoneal fluid of this guinea pig.

The subsequent history of this strain is as follows. It was used in the form of the primary culture from the guinea pig to infect a heifer calf. The infected urine from this calf was used to transmit the infection to another heifer. This direct bovine-to-bovine transmission was continued through additional passages. Urine from the fifth-serial-passage heifer served for exposure of challenge group I. Additional bovine passages provided infectious urine for challenging subsequent groups.

The virulence of this strain for cattle appears to have been maintained throughout the period required for these studies. Abortions followed infection in two instances, one prior to and the other subsequent to, the period covered by this report. Deaths occurred in three calves as the result of infection with this strain. These incidents occurred at widely spaced intervals during the investigation. The m.i.d. for baby chicks and for recently weaned hamsters continued at low levels throughout this interval (approximately 100 and less than 10 leptospires, respectively).

Method of Challenge. Urine from shedder cattle was used throughout these studies as infectious material for challenging the vaccinated animals and controls. The cattle that served as sources of urine were either selected from a recently exposed group or infected primarily for this purpose. The urine was collected in a graduated cylinder and immediately diluted (1:2 or more) in order to favor survival of leptospires for the period of time required (30 to 60 minutes) for exposure of the animals. Bovine urine is an unfavorable medium for survival of *L. pomona*; prompt dilution after collection tends to prolong viability.[10] Water containing suspended kaolin, several tablespoonsfull per liter, was used as the diluent. The kaolin was added on the assumption that its adsorbent properties might further reduce the antileptospiral action of the urine.

The cattle were exposed in a manner intended to simulate natural routes for transmission. The diluted urine was instilled into the eyes (about 0.5 ml.) and nostrils (25 to 30 ml.) since transmission by multiple exposure through either of these routes had been shown to be regularly successful. Exposure through the eyes and nostrils was repeated, daily, four to six times. Observations made during field studies of epizootic leptospirosis suggested, and subsequent experience proved, that drinking water may be a vehicle.[8,9] For this reason the water, dispensed in galvanized metal tanks, was contaminated by frequent addi-

TABLE 2. Challenge Data

Challenge group	Age group	Substrain used* represents: (Passage)	Infectious urine administered through:	
I	Heifer	5th bov.	Eyes and nostrils	(6 days)**
			Drinking water	(9 days)†
II	Calf	5th bov.	Eyes and nostrils	(6 days)
			Drinking water	(10 days)
III	Calf	6th bov.	Eyes and nostrils	(4 days)
			Drinking water	(6 days)

*A virulent "field" strain, originally isolated by guinea-pig inoculation and subsequently maintained by direct bovine-to-bovine passage.
**Animals were exposed through the eyes and nostrils once daily.
†Drinking water was contaminated by frequent additions of shedder urine. Leptospires survived in the water with little, if any, decrease in numbers for at least 6 hours.

TABLE 3. Titration of Degree and Duration of Infectivity of Contaminated Water. (Serological data on hamsters 4½ weeks after inoculation.)

Dilution of tank water	Initial sample	3-hour sample	6-hour sample	22-hour sample
Undiluted	....	+	+	+
10^{-1}	....	+	+	....
10^{-2}	+	—	+	....
10^{-3}	—	—	—	....
10^{-4}	—	—	....	....

+ = hamsters became seropositive as the result of infection.
— = hamsters did not become seropositive.

tion of shedder urine during each day for six to ten days. The supply of water was adjusted as closely as possible to the actual requirements of the cattle in order to reduce dilution of the leptospires to a minimum.

The order in which the individual animals were exposed was deliberately varied since it was observed that the more docile animals otherwise tended to be among the first to receive the infectious material. Table 2 gives the challenge data in summarized form.

The apparent quality of the urine as infectious material was determined by frequent darkfield examination. The diluted urine used for instillation into the eyes and nostrils was tested for infectivity, both before and after use by intraperitoneal inoculation of hamsters or guinea pigs. The contaminated water also was tested or titrated at intervals, after addition of urine, to determine how long leptospires survived. (See table 3.)

Criteria of Infection in Vaccinees and Controls. Agglutination-lysis titers resulting from vaccination were low (sometimes entirely negative). Therefore, either the appearance of agglutinins at high titer, or a clearly defined increase (100-fold or more) over the vaccination titer, was found to be a reliable criterion of infection in vaccinated cattle. The following supplemental or confirmatory methods also were employed: (1) Daily rectal temperature was taken for two or more weeks after exposure; (2) laboratory animals were sometimes inoculated with blood samples at the time of, or shortly after, febrile response; (3) darkfield examinations of urine samples were made at intervals for several weeks after serological evidence of infection was first observed; and (4) laboratory animals were inoculated with the urine samples from the darkfield-negative cattle.

Groups Challenged. Twelve of the 36 vaccinated heifers and the 17 calf-vaccinees

TABLE 4. Results of Challenge of Heifer-vaccinees (Group I) 7½ to 8½ Months after Vaccination

Animal No.	Status	Serological titers (A-L* test) Post-vac. (6 wk.)	Pre-chall.	Post-chall. (6 wk.)	Clinical data Fever (max.)	Leptospiruria (number "shed"**)	Resisted infection†
4	No. 1 vac.	±	±	—	.....	.....	
17	No. 1 vac.	10^{-2}	10^{-1}	—	.....	.....	
21	No. 1 vac.	10^{-1}	±	—	.....	.....	5/5
23	No. 1 vac.	10^{-2}	10^{-1}	±	.....	.....	
24	No. 1 vac.	10^{-2}	10^{-1}	±	.....	.....	
31	No. 2 vac.	10^{-2}	±	—	.....	.....	
32	No. 2 vac.	10^{-1}	—	10^{-4}	None	V. few	
34	No. 2 vac.	10^{-1}	10^{-1}	±	.....	.....	4/5
35	No. 2 vac.	10^{-2}	±	±	.....	.....	
38	No. 2 vac.	10^{-2}	10^{-1}	10^{-2}	.....	.....	
10	WSC vac.	10^{-2}	10^{-1}	10^{-2}	.....	.....	2/2
13	WSC vac.	10^{-2}	10^{-2}	10^{-1}	.....	.....	
84	Control	.....	—	10^{-3}	None	None detected	
87	Control	.....	—	10^{-5}	107.5	V. few††	
103	Control	.....	—	10^{-4}	103.7	Few	0/5
104	Control	.....	—	10^{-4}	104.9	V. many	
105	Control	.....	—	10^{-5}	105.0	V. many	

*Agglutination-lysis test; ± = weak reaction.
**None detected = either by darkfield examination or animal inoculation.
V. few = not observed by darkfield but recovered by laboratory-animal inoculation.
Few = small numbers observed by darkfield examination.
V. many = many millions of leptospires per ml. (confirmed by counting-chamber method).
†Ratios of numbers resisting infection to numbers exposed.
††Leptospiremia was also demonstrated in this heifer.

(one died before challenge) were challenged 6½ to 8½ months after vaccination. They were exposed in three separate groups, designated by Roman numerals I through III, along with normal controls. The composition of each group, *i.e.* — the number of vaccinees, the bacterins they received, the interval between vaccination and challenge and the number of control animals employed — is included in the tabulated data (tables 4-6). The results are presented below.

Results

Examination of Infectious Material. Darkfield examination of the shedder urine used for challenge regularly showed motile leptospires. Viable leptospires were also demonstrated on several occasions in the diluted urine after exposure of the cattle was completed. On three occasions, once during each challenge period, contaminated drinking water was tested to determine how long organisms survived. They were found in samples taken at intervals ranging from 1.5 to 22 hours after addition of the urine. One tank of water used for exposure of the calves in group III was titrated at intervals for infectivity in hamsters. Twenty-five gallons of water were contaminated by the addition of about 1,550 ml. of pooled urine from three shedder calves. After mixing thoroughly, a sample was taken, serial tenfold dilutions were made and 0.5 ml. quantities were inoculated into hamsters. This procedure was repeated 3, 6 and 22 hours later. The results were determined by testing the hamster sera for agglutinins 4½ weeks after inoculation.

Results of Challenge. The results of challenge of three separate groups of vaccinated animals are presented in table 4 through 6. The results obtained with all three groups are summarized in Table 7.

Group I. (See table 4). Only one of the 12 vaccinees in this group became infected, in contrast to all five controls. This animal (32) was afebrile. Leptospires were never observed by darkfield examination of the urine, although the organism was recovered from the urine by guinea-pig inoculation 31 days after exposure began. Four of the five controls became febrile 10 to 12 days after exposure. All but one control, the afebrile heifer, shed leptospires. Two (104 and 105) shed for about three and five

TABLE 5. Results of Challenge of Part of the Young Calf-vaccinees (Group II) 6½ Months after Vaccination

Animals No.	Status	Serological titers (A-L* Test) Post-vac. (6 wk.)	Pre-chall.	Post-chall. (6 wk.)	Clinical Data Fever (max.)	Leptospiruria (number "shed"**)	Resisted infection†
60	No. 1 vac.	10^{-2}	10^{-1}	10^{-1}	.....	.....	
61	No. 1 vac.	—	—	10^{-4}	None	None detected	
62	No. 1 vac.	—	—	10^{-2}	104.5	None detected	1/4
63	No. 1 vac.	—	—	10^{-2}	None	V. few	
64	No. 2 vac.	—	—	10^{-3}	106.6	V. few	
65	No. 2 vac.	10^{-1}	—	—	.....	.....	
66	No. 2 vac.	—	—	10^{-4}	105.6	V. many	1/5
67	No. 2 vac.	—	—	10^{-3}	103.4	Many	
68	No. 2 vac.	—	—	10^{-5}	106.0††	V. many	
73	Control	.....	—	10^{-4}	106.0††	Few	
74	Control	.....	—	10^{-5}	104.3	V. many	
75	Control	.....	—	10^{-4}	105.6††	V. many	0/6
79	Control	.....	—	10^{-5}	103.6	None detected	
81	Control	.....	—	10^{-4}	105.8††	Few	
109	Control	.....	—	10^{-4}	105.3††	V. many	

*Agglutination-lysis test.
**None detected = either by darkfield examination or animal inoculation.
V. few = not observed by darkfield but recovered by laboratory-animal inoculation.
Few = small numbers observed by darkfield examination.
Many = numbers ranging from many thousands to several millions/ml. (confirmed by counting-chamber method).
V. many = many millions of leptospires per ml. (confirmed by counting-chamber method).
†Ratio of numbers resisting infection to numbers exposed.
††Calves 68, 73, 75 and 81 showed hemolytic anemia and hemoglobinuria. No. 109 became weak and listless, scoured and excreted enormous numbers of leptospires for 2½ months; he never prospered. The 4 control calves showed evidence of febrile relapse.

weeks, respectively. Both excreted enormous numbers. One of these (105) showed 24,500,000 and 25,000,000 per ml. by the counting-chamber method on two successive days and was estimated to be shedding twice that number ten days later. No. 104 showed evidence of febrile relapse.

Group II. (See table 5.) Seven of the nine vaccinated calves, and all of the controls, became infected. Most of them (five of the seven vaccinated animals and five of the six controls) shed leptospires. However, the controls showed some evidence of being more severely affected than the vaccinees. One control calf (73) became severely ill. This animal passed dark-red urine for several days, beginning 13 days after exposure. A blood sample taken at that time revealed gross evidence of pronounced hemolytic anemia (hemoglobin in serum and markedly reduced cell volume). On the 16th day the urine was still dark red and gave a 4+ test for albumin. Hematology on the 18th day gave the following results: Hemoglobin, 3.5 gm.; r.b.c., 2.36 million; hematocrit, 12; also anisocytosis, poikilocytosis and apparent hypochromia. Two additional control calves (75 and 81) showed hemoglobinuria and hemolytic anemia, though less pronounced. One calf (109) became severely ill and excreted enormous numbers of leptospires (estimated to exceed 100,000,000 per ml.) for an unusually long time (up to about 11 weeks after exposure). Recurrent fever suggested that this calf and three other control calves in this group experienced relapses about three weeks after the first febrile period.

On the other hand, only one (68) of the seven vaccinated calves that infected showed evidence of hemolytic anemia. The data suggest, further, that vaccinated cattle may have a tendency to shed fewer organisms than unvaccinated animals. This apparent tendency is evident when the results obtained with the control calves and those that received no. 1 bacterin are compared. Shedding was not detected in two of the three vaccinated calves that infected, and the third shed so few that they were never found by darkfield examination and only once by laboratory animal inoculation. The calves that received the no. 2 bacterin do not seem to have fared as well in this respect. Except for the fact that one of the five resisted infection, they shed similarly to the controls.

Group III. (See table 6.) Since the results with group II indicated that vaccination of calves at this early age (one and two months) did not elicit much protection, the remaining young calf-vaccinees were promptly challenged. The results were as follows. Six of the eight vaccinated calves became infected, three of four in each vaccine sub-group. All three controls became

TABLE 6. Results of Challenge of the Remaining Young Calf-vaccinees (Group III) 8 Months after Vaccination

Animal No.	Status	Serological titers (A-L* Test) Post-vac. (6 wk.)	Pre-chall.	Post-chall. (6 wk.)	Clinical Data Fever (max.)	Leptospiruria (number "shed"**)	Resisted infection†
51	No. 1 vac.	10^{-1}††	—	10^{-3}	107.4	V. many	
52	No. 1 vac.	—	—	10^{-3}	None	Few	1/4
53	No. 1 vac.	—	—	—	.....	.....	
54	No. 1 vac.	—	—	10^{-3}	None	None detected	
45	No. 2 vac.	—	—	10^{-3}	103.3	None detected	
46	No. 2 vac.	10^{-1}	10^{-1}	—	.....	.....	
48	No. 2 vac.	—	—	10^{-3}	105.4	V. many	1/4
49	No. 2 vac.	—	—	10^{-3}	105.2	V. many	
123	Control	.....	—	10^{-3}	104.2	Few	
124	Control	.....	—	10^{-4}	103.1	Few	0/3
102	Control	.....	—	10^{-3}	(no record)	V. many	

*Agglutination-lysis test.
**None detected = either by darkfield examination or animal inoculation.
Few = small numbers observed by darkfield examination.
V. many = many millions of leptospires per ml. (confirmed by counting-chamber method).
†Ratio of numbers resisting infection to numbers exposed.
††This calf was seropositive (10^{-2}) when purchased; the titer disappeared within about 2 months and was presumably acquired passively through colostrum from the mother.

TABLE 7. Summarized Data: Comparative Evaluation of *L. pomona* Bacterins

Challenge groups & age when vaccinated	Vaccination-challenge interval	Ratio of infected to exposed					
		BACTERIN			Total vaccinees	Controls	Resisted infection (Totals)*
		No. 1	No. 2	WSC			
Group I (6-8 mo. heifers)	7½-8½ mos.	0/5	1/5	0/2	1/12	.....	11/12
Controls	.....	.....	.....	.....	.....	5/5	0/5
Groups II & III (1-2 mo. calves)	6½-8	6/8	7/9	.....	13/17	.....	4/17
Controls	.....	.....	.....	.....	.....	9/9	0/9

*Ratios of numbers resisting infection to numbers exposed.

infected. The results of this experiment show no evidence that one vaccine is superior to the other in any respect. Nevertheless, the data tend to substantiate an observation made in the study of group II, that even though some of the animals do become infected, shedding may be supressed. Thus, two of six vaccinated calves that became infected apparently did not excrete leptospires in the urine, while all three controls became shedders.

(See table 7 for a summary of the results obtained with all three groups.)

Discussion

Because of the nature of the material and methods used for challenge, the dosage of leptospires could not be standardized. The quality of the shedder urine varied somewhat from group to group and also, to some extent, in each group during the period of exposure. The quantity of urine that we were able to collect also varied with different shedders. Some attempt was made to estimate, by darkfield examination, the numbers of leptospires present in the urine and counts were sometimes made by means of the Petroff-Hauser counting chamber. However, accurate estimates or counts can usually be made only during an early phase of shedding, before agglutinins appear (with the consequent agglutination of the Leptospira *in vivo*). Furthermore, the ratio of motile to non-motile spirochetes in bovine urine varies widely. In fact, even when the sample is examined immediately after collection they are often predominantly nonmotile. Although we have made observations that suggest that some of the nonmotile leptospires may be viable, non-motility is probably indicative of injury and perhaps often of actual death. For these reasons we have concentrated our attention on attempts to insure that all cattle tested be heavily and repeatedly exposed.

As is indicated above, the animals were exposed through the eyes and nostrils (by instillation) and by mouth (through contamination of the drinking water). We had previously shown that infection could be readily induced in cattle by exposure through any one of these routes. Therefore, multiple exposure to large doses of infected urine through all three routes was chosen as the method of challenge. It was thought that this procedure would simulate transmission under natural conditions. Further, it was felt that multiple exposure to large amounts of grossly infected urine would probably equal, and possibly often exceed,

Kidney lesions of bovine leptospirosis. Note areas of necrosis (white spots) which are characteristic autopsy findings in advanced cases.

doses that would be naturally experienced by many animals. The method shows every indication of being reliable since all 30 control animals in all five groups challenged to date have become infected following exposure.

Every effort was made to keep these test animals on a comparable basis. The same lots of vaccine were used for immunization. The vaccination-challenge intervals for the three groups reported here were similar (6½ to 8 months) and all three groups were brought in for challenge within a period of less than two months. The methods of exposure were essentially the same. Furthermore, all controls in all three groups, 5, 6 and 3 respectively (total, 14), became infected and 12 of them became shedders. It appears, then, that the groups were comparable in all these respects.

It may be noted, however, that the heifers and calves differed strikingly in their response to vaccination in two respects: (1) Serological response and (2) resistance to infection on challenge. Most of the older animals became seropositive, with agglutinin titers ranging between 10^{-1} and 10^{-2} six weeks after vaccination. On the other hand, only three of the 17 calves became seropositive. The results of challenge show an apparent correlation between the magnitude of serological response and resistance to infection. The only vaccinated heifer that became infected was one of the four that showed the lower agglutinin titers following vaccination and the only one of the 12 that gave an entirely negative test just before challenge. In contrast to the heifers, only three of the 17 calves produced agglutinins as the result of vaccination. These three calves, and one other that showed no agglutinins at 10^{-1} (the lowest dilution tested) following vaccination, were the only ones that resisted infection on challenge.

There was some evidence that the disease was less severe in the vaccinated animals that became infected. They tended to differ from the controls in such clinical manifestations as occurrence of fever (milder cases are afebrile), depression and inappetence, hemolytic anemia and hemoglobinuria. (The latter two occur only in cattle that are very ill.) Thus, three of the control calves, but only one vaccinee, in group II showed hemoglobinuria and hemolytic anemia. Also, febrile relapse was noted only among control animals (one in group I and 4 in group II).

Particularly interesting was the observation that vaccinated animals seem less likely to excrete leptospires than the unvaccinated controls. Four of the 13 vaccinated calves which became infected apparently never shed the organism, while only one of the nine control calves failed to shed. In several instances vaccinated animals that became shedders excreted few leptospires, and often only transiently. If this difference actually exists, an important additional aspect of vaccination as a control measure is obvious.

Summary

1. *Leptospira pomona* bacterins appear to induce in six- to eight-month-old heifers a high level of immunity which persists for at least seven or eight months.* Most (11/12) of the heifers challenged resisted infection.

2. By contrast, calves vaccinated at one to two months of age appear to acquire much less resistance. A large proportion (13/17) of the vaccinated calves became infected when exposed six to eight months after vaccination.

3. A correlation appears to exist between the magnitude of serological response to the bacterin and resistance to infection on challenge.

4. Vaccinated cattle that became infected on challenge often appeared to experience a mild form of the disease. They seem to have shed leptospires less regularly than the controls. Furthermore, the vaccinated cattle that did excrete leptospires in the urine often shed appreciably fewer than the controls.

5. The degrees of resistance induced by the three bacterins did not appear to differ materially.

Continued on page 449

*Current studies, still in progress, show that calves vaccinated at three to five months of age may exhibit a high level of immunity when challenged 13 months after vaccination.

Serious losses of cattle are reported as a field experience following the simple procedures of spraying cattle for fly control. Shown (l.) is heifer under sedation. Treatment relieved tetanic seizure and effected prompt and complete recovery.

Endrin Poisoning: A Case Report

Q. R. JEROME, D.V.M.

West Memphis, Arkansas

THERE is little literature readily available to the general practitioner concerning the toxicity of the chlorinated hydrocarbons. The writer could find little practical data that dealt with the specific compounds involved in this case.

Editor's Note — Since submitted for publication a comprehensive textbook — Veterinary Toxicology has been published by The Williams and Wilkins Co., Baltimore, Md.

Case History

On Saturday, Aug. 25, 1956, a herd of 406 grade Hereford cattle were congregated at the holding pens and chute on a large cotton plantation in Crittendon County, Arkansas, and 126 head were vaccinated for blackleg.

On the attending veterinarian's advice, plans had been made to spray for flies at the same time. However, since vaccinating was not completed until near noon on Saturday, the plantation's payday, spraying was postponed.

The mixture for the spray operation was prepared on Saturday. The stock solution was toxaphene (chlorinated camphene), a widely used chlorinated hydrocarbon insecticide in petroleum distillate (Toxinox — Farnum Chemical Co.). It was mixed at a higher dilution than the 1:150 recommended by the manufacturer. Five quarts of the 45% stock solution were mixed in four 55 gallon barrels (220 gallons) of water, giving a 1:176 dilution. Two of the drums used for mixing had contained endrin, another of the large group of chlorinated hydrocarbons employed as an agricultural poison, and had been cleaned by a farm hand.

Endrin, like toxaphene, is a chlorinated hydrocarbon with the chemical name hexachloro-epoxy-octahydro-endo-dromethanonaphthalene. In the pure form it is resinous, insoluble in water, and soluble in petroleum hydrocarbons. It is used commonly to kill cotton parasites in the following mixture: Endrin 19.5%, petroleum hydrocarbons 70.5%, inert ingredients 10%. When the petroleum hydrocarbons are volatilized, the resulting resinous, water proof residue would be 66% endrin and 34% inert ingredients.

The pump used for the spray operation was a gear type operated from the power take-off of a tractor. Attached to the pump

was a by-pass valve and hose that was placed back into the barrel of spray to agitate the mixture.

Actual spraying was not started until 9:00 a.m. the following Monday, fully 48 hours after the mixture had been prepared. During the next two hours spraying was stopped several times due to light showers. By 11:00 a.m., however, approximately 370 yearling steers, heifers and cows had been sprayed.

At this time four calves were noticed with what the herdsman described as "fits." A veterinarian was summoned and spraying halted at once. When the veterinarian arrived approximately 20 minutes later, 45 head of cattle, including all ages, were dead. Treatment of the remaining animals was begun immediately, but deaths continued to occur at an increasing rate.

Symptoms

Symptoms exhibited varied considerably, but for the purpose of description they can be classified as peracute, acute and subacute.

Peracute cases appeared normal while grazing. Suddenly they would throw up their heads as though startled, exhibit a twitching of facial muscles and ears with rapid blinking of the eyes, and jump as though frightened. Symptoms rarely lasted for more than 30 seconds before complete respiratory and cardiac arrest. No peracute cases were saved by treatment.

No warning of the first attack or tetanic siezure characterized those cases classified as acute. After falling, these animals made spasmodic attempts to rise. Tetanic convulsions forced them to remain down, however. Almost all exhibited a grinding of teeth and excess salivation. All exhibited respiratory embarrassment with short convulsive inhalations and exhalations, muscular spasms and uncontrolled defecation and micturation. Without medication, acute cases were dead within a few minutes.

Those classified as subacute exhibited the same general nervous symptoms as acute and peracute cases, albeit in a milder degree. Spasms lasted for 30 seconds to two minutes, after which grazing was resumed. Animals did not always fall to the ground and exhibited only slight cyanosis. Treatment brought prompt and complete recovery. In untreated animals, symptoms either increased in severity until the acute stage was manifest, or gradually diminished for up to 48 hours until complete recovery was apparent.

Of approximately 370 animals sprayed, 218 were affected. Morbidity rate for the entire group was 71%. Of 218 affected, 183

Pasture scene of dead and dying cattle folllowing spraying for fly control.

Emergency treatment included relief of nervous symptoms existing in various degrees of severity.

died; a mortality rate of 49%. At least 95% of the deaths occurred within 2½ hours after onset of symptoms; 5% occurred sporadically through the next six hours. Deaths occurred at an increasing rate in all ages until at the peak an estimated 10 to 15 head per minute were falling. Losses appraised on the basis of replacement cost alone came to $22,670.

Autopsy Findings

Findings at autopsy were meager. The only constant gross lesions were myocardial hemorrhages varying in size from petechia to infarcts. Always present was evidence of acute tissue anoxia as dark blood and cyanosis of all visible mucous membranes and viscera.

Inconstant lesions consisted of acute swelling of the liver and spleen, subcutaneous petechial hemorrhages and dark thick urine. One autopsy revealed excess pericardial fluid which was dark in color.

Toxicological Findings

Both stock solution (45% toxaphene in petroleum distillate) and the mixed spray solution were analyzed by two laboratories: The Agriculture Research Service, USDA, Plant Pest Control, Washington, D.C.; and State Crime Laboratory, Department of Public Safety, Atlanta, Ga.

The stock solution checked out closely to the percentage of toxaphene when tested by the infra-red spectrophotometer.

The mixed spray solution was determined by the Georgia laboratory to have a chlorine content above that which would be present in a 1:176 dilution of the 45% toxaphene stock solution. The United States Department of Agriculture laboratory reported that the mixed spray solution contained endrin (0.34%) as well as the expected concentration of toxaphene. Analysis was made with the infra-red spectrophotometer.

Available literature cites no maximum safe or minimum toxic doses of endrin when applied in a spray to cattle. However, this information is available for dieldrin (1,2,-3,4,10,10 hexachloro-6-7 epoxy, 1,4,4a,5,6,-7,8,8a-octahydro 1,4 endo, exo-5,8-dimethanonaphthalene) a closely related chemical. The minimum toxic dose and maximum safe doses for aldrin another closely related compound are 0.25% and 0.1% respectively. If these toxic levels are the same for endrin the spray solution used contained 340% of the maximum safe dose and 136% of the minimum toxic dose of endrin.

Treatment

Pentobarbital sodium 1 gr./cc. with Sinan (Myotal—Warren-Teed) were administered intravenously to effect to the first few animals until a calculated effective dosage schedule was established. Dosage established as 20 cc. for smaller animals weighing up to 400 lb.; 40 cc. for animals up to 800 lb.; and 60 cc. for adults. The pentobarbital solution immediately available was soon depleted, and the attending veterinarian turned to chloral hydrate as a sedative. In an effort to save time and treat more animals quickly, an approximate 20% solution of chloral hydrate was substituted for the conventional 7% solution. This was prepared by adding three "country" ounces to 500 cc. distilled water. It was administered at the same dosage rate as the pentobarbital solution.

Conclusions

As evidenced by chemical analysis, the stock solution of spray contained no endrin. However, the mixed spray solution contained the implicated compound. The fact that mixtures of the stock solution of toxaphene diluted according to manufacturers' recommendations in clean containers produced no toxic symptoms would indicate that endrin was the lethal agent.

The assumed sequence of circumstances are as follows: Barrels labeled endrin originally containing 19.5% active ingredient in 70.5% petroleum hydrocarbons, contained the resinous insoluble in water formed by evaporation of the petroleum hydrocarbons. This residue was not removed by casual washing with cold water. Water was then added and an emulsion formed by adding the petroleum distillate carrying toxaphene 45%. While the endrin residue was insoluble in water it was soluble in the petroleum distillate in emulsion. The fact that the emulsion was allowed to stand at least 44 hours would certainly give ample time for these residues to be dissolved. From there on the simple operation of applying the solution was all that was required to poison this herd of cattle with endrin.

All chlorinated hydrocarbons in toxic doses act to stimulate the central nervous system regardless of how much their individual toxicity may vary within a particular class of chemicals. Specific antidote would then be a central nervous system depressant or anesthetic. However the dosage of antidote would necessarily depend on the offending toxin, the dose of the toxin and the route of poisoning, *i.e.*, oral, dermal, or inhalation.

Comments

This incident is an example of what can happen when there is a lack of proper supervision where large herds of cattle are handled. Veterinarians who dispense insecticides to their clients for use in fly control programs are impelled by duty to impress upon their clients the dangers inherent in all insecticides, particularly the chlorinated hydrocarbons.

Accidental poisoning with agricultural poisons are not uncommon in our practice area. The incident reported points up the explosive potential of toxicity to animals of agricultural chemicals in common use on farms and ranches everywhere.

Salt Replacement

Sunstroke and heat exhaustion rate high among the many summer safety hazards. A vital hot weather safety measure is the addition of extra salt in the diet. This extra salt is especially important to farm workers who must spend long hours at hard work regardless of the heat.

Extra salt with meals and salt tablets with each glass of water, or a tablespoon of salt to each gallon of drinking water will help replace the body salt lost in heavy perspiration, and guard against heat prostration. The National Safety Council recommends the following precautions:

1. Avoid too much exposure to direct sunlight and wear a hat out of doors.

2. Avoid over-exertion, particularly in the early part of a heat wave.

3. Wear light, porous and loose fitting clothing.

4. Increase the use of salt in food and use salt tablets or salt in drinking water.

5. Drink plenty of water throughout the day, avoid ice water and alcohol.

6. Get plenty of rest and bathe regularly.

7. Heat exhaustion and sunstroke are different, although both result from overexposure to high external heat. With heat exhaustion the victim's skin is cold, while with sunstroke the skin is hot and dry.

In applying first aid treatment to a person suffering from heat sickness, keep in mind this simple rule: If the patient is cold, make him warm; if he is hot, make him cool.

New Lungworm Treatment for Swine

JOHN R. DICK, M.S., D.V.M.

Fort Dodge Laboratories
Fort Dodge, Iowa

DURING the past decade or more, swine authorities have become increasingly aware of the important role of lungworm infection in the economy of swine production.

This awareness has developed because of major advances in understanding of swine diseases, development of preventive and therapeutic drugs, and improved feed supplements which have served to combat successfully some of the relatively prevalent common disease complexes of these animals. Control of some of these diseases has removed a mask, in a sense, so that a true realization of the damage potential of lungworm infection can be evaluated accurately.

Metastrongylus apri, M. pudendotectus, and *M. salmi* are important lungworm species parasitic in swine. Their distribution is widespread. There are probably few hog producing areas in the United States that are free of these parasites.

Reports of observations at slaughtering establishments indicate that as high as 50 to 70% of swine processed may exhibit evidence of lungworm infection. It must be quite evident then that losses due to this parasite are significant annual losses as yet inaccurately determined.

Life Cycle

Swine lungworms require an intermediate host for completion of their life cycle. (See fig. 1) The adult female passes large numbers of thin shelled ova which are washed by ciliary action from the smaller air passages to the pharynx, are swallowed and eventually pass out with the feces. Earthworms, particularly *Eisenia foetida,* pick up the eggs which eventually hatch in the earthworm intestine. As many as 2,000 lungworm larvae have been counted from a single earthworm. An infected earthworm population has been known to be infective for hogs for up to ten years.

After infected earthworms are eaten by swine, infective larvae penetrate the intesti-

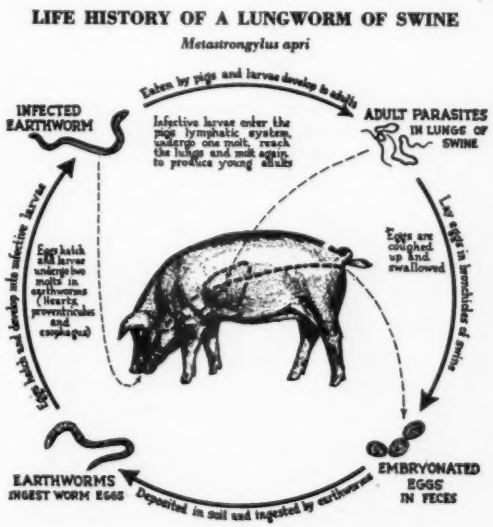

LIFE HISTORY OF A LUNGWORM OF SWINE
Metastrongylus apri
Eaten by pigs and larvae develop to adults
INFECTED EARTHWORM
Infective larvae enter the pigs lymphatic system, undergo one molt, reach the lungs and molt again to produce young adults
ADULT PARASITES IN LUNGS OF SWINE
Lay eggs in bronchioles of swine
Eggs are coughed up and swallowed
Eggs hatch and larvae undergo two molts in earthworms (Hearts, proventriculus and esophagus)
Eggs hatch and develop into infective larvae
EARTHWORMS INGEST WORM EGGS
Deposited in soil and ingested by earthworms
EMBRYONATED EGGS IN FECES

Fig. 1. Life Cycle of the Swine Lungworm.

—from Microscopic Diagnosis of Parasitism in Domestic Animals — by permission from Univ. of Illinois, College of Veterinary Medicine, Cir. 639.

nal wall and pass eventually to the lungs where females mature. Eggs are passed beginning approximately 25 to 30 days after ingestion of infective larvae.

Diagnosis

Coughing, interrupted growth rates and unthriftiness are suggestive of lungworm infection but diagnosis of drove infection is specifically made on postmortem examination or by finding lungworm ova in the feces of suspected swine.

A confirmed diagnosis must be made so that infection will not be mistaken for other respiratory diseases which present similar symptoms.

Adult parasites are whitish, thread-like forms attaining lengths up to 2 in. They are found commonly in smaller bronchioles, and in severe cases in the bronchi and trachea. Parasitized lung may reveal wedge-shaped areas which first appear usually along the posterior lung margins and particularly the ventral tips. If the numbers of parasites are large, these emphysematous wedge-shaped areas may appear along most of the margins, extending anteriorly. As damage increases, more and more lung tissue becomes non-functional. Serious tissue anoxia may be evident in severe infection. When cut about an inch from the boarders and squeezed between the fingers, lung tissue will usually reveal adult parasites in infected individuals.

Diagnosis by observation of the ova is a simple procedure and any of the recognized fecal examination procedures will give good results. There is little possibility of failure to recognize the thin-shelled ova in which a coiled larva can, as a rule, be observed readily.

Treatment

Walley,[1] in screening some 3,000 drugs for anthelmintic activity against lungworms found that cyanacethydrazide, a complex compound was the most effective. This

TABLE 1. Selection of Clinical Reports of Field Trials with Cyanacethydrazide in Swine Lungworm Infection

State	No. treated	Subcutaneous admin. (1 cc. per 35 lb. wt.)	No. Controls	Comments of Clinicians
Tennessee	6	2 times in 2 weeks	5	Treated pigs gained approximately twice as much as untreated pigs. Stopped coughing within 2 days. Owner insisted on treatment of controls after 2 weeks.
Iowa	73	3 times in 3 weeks	5	Several pigs died prior to treatment; no death loss following treatment. Coughing in herd ceased after first treatment. With exception of 8 to 10 pigs, results were surprisingly good. All untreated pigs died.
Wisconsin	96	3 times in 3 weeks	0	Condition of herd improved. No clinical cases after first day of initial treatment.
Tennessee	15	2 times in 2 weeks	4	Treated pigs gained approximately 5 lb. in 2 weeks after treatment. Untreated animals averaged 1½ lb. loss in weight during this period. Controls were then treated.
Iowa	17	2 times in 3 days	60	Only animals exhibiting acute symptoms were treated and are now doing as well as the normal pigs.
Indiana	100	One dose	0	10 deaths prior to treatment; no deaths in 1 month after treatment.
Tennessee	6	2 times in 2 weeks	6	Treated pigs stopped coughing within 24 hours, and gained 7 lb. more than controls during 2 weeks. Control pigs were then treated.
Illinois	50	2 times in 2 weeks	0	No improvement observed in 8 pigs. Good results in 42. This drug is of value if used before extensive damage is done to the lungs.
Tennessee	38	2 times in 2 weeks	22	All treated stopped coughing within 24 hours and gained 14½ lb. in 2 weeks, as compared with 6½ lb. for control pigs. Controls were then treated.
Iowa	16	3 times in 3 weeks	54	No improvement noted in treated pigs in comparison to controls. Since virus pneumonia was so severe in this herd, I can not feel the drug was given a fair test.

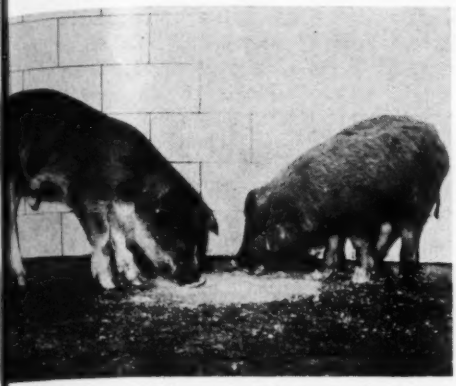


Fig. 2. Confirmed lungworm infection in litter mates. Treated pig (l.) gained 10 lb. more than untreated littermate during 23-day post-treatment period.

substance, a white crystalline powder, has been made available in the United States by the Fort Dodge Laboratories under the trade name Dictycide. Studies have indicated its relative nontoxicity.

One recommended dose injected subcutaneously is 65 to 100% effective. Vermifugal action is usually exerted within eight hours. Living lungworms are prompted to move from the bronchioles and bronchi into the trachea where they are coughed from the respiratory tract. Severely infected animals may be retreated in 24 hours or at any later date without toxic manifestations.

Field Observations

During the past year, over 2,000 head of swine have been treated with Dictycide in closely observed field trial evaluations. This figure represents some 26 herds in nine different states. Twenty veterinarians who administered the drug have added their personal comments to actual data accumulated during the evaluation period. (See table 1.)

The new drug is packaged in vials containing 25 gm. of powder. Dosage is prepared by adding 80 cc. of sterile, distilled water and warming in hot water. This package results in 100 cc. of colorless solution which will remain stable for at least 14 days. Low temperatures tend to cause the material to crystallize out of solution, but heating will bring about resolution without effect on the action of the drug.

All material used in the field trials was prepared in the above manner. Warm water may be used as diluent if for immediate use.

Throughout field trials, one constant dose level was recommended and followed closely. The recommended dose (1 cc. solution for each 35 lb. body weight) was injected subcutaneously. Maximum dose for swine is 4 cc. Estimation of body weight must be made with care, particularly in debilitated animals. In fact, many of the severely debilitated animals in the field trials were actually weighed so that the operator would have a fairly accurate standard of comparison for animals within a group.

All droves treated were diagnosed as being lungworm infected. In about 97% of these, diagnosis was established at autopsy.

Most droves were treated twice at 14-day interval and these were composed for the most part of young feeder pigs weighing 25 to 75 lb.

Some were treated once, and some three times. The thrice treated droves were injected either on three successive days or three successive weeks.

Summary Data

Certain outstanding facts are now evident in regard to the use of cyanacethydrazide (Dictycide—Fort Dodge) in swine.

1. The drug is remarkably effective in treating known lungworm infections. Symptoms such as coughing, poor feed conversion, poor weight gains, and general unthriftiness are corrected with dramatic promptness. Of cases treated in these trials, 95% were benefited.

2. The drug is compatible with other anthelmintics, and can be used with such drugs whenever the situation warrants this procedure.

3. The drug is compatible with all immunizing agents, if the animal is considered physically fit for immunization.

4. Reactions of nervousness and hyperexcitability were reported in only two pigs.

Continued on page 455

Efforts to prevent absorption of phenothiazine and subsequent discoloration of milk from treated cows and goats has been subject of considerable investigation. Research reported herein fails to confirm earlier reports that a powder made from a tree native to the Near East (Carob tree), when added to phenothiazine, prevented absorption of the anthelmintic from the digestive tract.

Influence of Carob Flour on Absorption and Elimination of Phenothiazine

M. L. COLGLAZIER, B.A., E. H. WILKENS, B.S. and F. D. ENZIE, D.V.M.

Animal Disease and Parasite Research Division
Agricultural Research Service, USDA
Beltsville, Maryland

IN an earlier report[1] on certain aspects of the use of phenothiazine for the control of gastrointestinal roundworms of dairy goats, it was noted that catabolic derivatives of the chemical are eliminated in the milk and that these excretion products, when present in sufficient amounts, cause the milk to become pink on exposure to air. Slight discoloration sometimes followed daily doses of as little as 0.5 to 1.0 gm., amounts that usually obtain in the low-level phenothiazine regimen employed successfully for parasite control in sheep. When present at these levels, however, the discoloration was generally detectable only when the milk was compared closely with a control specimen. It was concluded on the basis of available evidence that, insofar as the discoloration of milk was concerned, a low-level phenothiazine regimen that limited ingestion of the drug to a maximum of 1.0 gm. daily should be satisfactory for dairy goats. On the other hand, therapeutic doses of the drug, namely 25 to 35 gm., resulted in a pronounced pinkish discoloration which persisted for at least 48 hours. The intensity of the discoloration was considerably reduced on the second day, however, and was virtually nil thereafter.

Although there is no evidence that the discolored milk is harmful in any respect, it is not suitable for distribution through commercial channels for human consumption and must be discarded or fed to other animals. On this account, the report by Reddick[2] that carob flour, an intestinal adsorbent, prevents the absorption of phenothiazine from the intestinal tract of cattle was of particular interest. This investigator observed no discoloration of the milk and/or urine from yearling calves and dairy cows

that were given a mixture of 3 parts phenothiazine and 1 part carob flour in amounts sufficient to provide as much as 75 gm. of the chemical in single doses or approximately 7 gm. daily for seven days in divided doses. Much of the manure from the animals was brick-red, indicating considerable elimination of the drug by way of the intestinal tract, but, significantly, the hair around the sheath of some of the treated steers showed a pink stain.

Because discoloration of milk has been a major deterrent to the use of this anthelmintic for dairy animals in production, it seemed desirable to check upon the promise shown by carob flour in this regard and to determine specifically whether or not the material was effective in preventing the absorption and subsequent elimination of phenothiazine in the milk of dairy goats.

Procedure

Observations were made from April 30 to July 8, 1956, on a herd of Toggenburg goats. Does that were nursing either one or two kids were confined in concrete-floored pens throughout the test period. In order to simulate the milking routine that usually obtains in commercial dairy herds, the kids were separated from their dams except for periods of about one hour at 8 a.m. and 3 p.m. daily, after which the udders were stripped of any milk that remained. Moreover, in an attempt to obtain comparable information on both heavy and light milk producers, two does with one and two kids, respectively, were employed in each dosage group. The phenothiazine used was of National Formulary grade, and the phenothiazine-carob flour mixture was a com-

TABLE 1. Effect of Therapeutic Doses

Animal No.	Date freshened (1956)	Treatment Drug	Date	Weight (lb.)	Dose[c] (gm.)	No. days	Discoloration of milk (hours after initial dose) 0	7	24	31	48	55	72	79	96	103	120	127	144
9	3-21	Vetrothiazine	4-30	90	52.08	1	—	++	++	++	++	+	+	*	—				
								++	++	++	+	+							
		Phenothiazine	5-15	90	37.5	1	—	++	++	+	+								
							—	++	++	++	++	+	+	*	—				
11[a]	3-18	V	4-30	80	52.08	1		++	++	++	+	+							
							—	++	++	++	++	+	*	—					
		P	5-15	80	37.5	1		++	++	++	+								
			4-30				—	++	++	++	++	++	++	+	+	*	*	—	
14	3-8	V	5-1	55	26.04	2		++	++	++	++	++	+	+					
			5-15				—	++	++	++	++	+	+	+	—				
		P	5-16	60	18.75	2		++	++	++	++	+							
			4-30				—	++	++	++	++	++	++	+	*	—			
13[a]	3-19	V	5-1	90	26.04	2		++	++	++	++	++	+						
			5-15				—	++	++	++	++	++	++	+	—				
		P	5-16	85	18.75	2		++	++	++	++	++	+						
			4-30				—	+	++	++	++	++	++	++	+	+	*	—	
6[b]	3-13	V	5-1	100	17.36	3			+	+	++	++	++	+	+				
			5-2																
			7-2				—	++	++	++	++	++	++	++	++	+	+	*	—
		V	7-3	50	17.36	3		++	++	++	++	++	++	++	+	+			
20	3-16		7-4																
			5-15				—	++	++	++	++	++	++	++	+	+	*	—	
		P	5-16	50	12.5	3		++	++	++	++	++	++	+					
			5-17																
			4-30				—	++	++	++	++	++	++	+	+	+	*	—	
		V	5-1	95	17.36	3		++	++	++	++	++	++	+					
4[a]	3-9		5-2																
			5-15				—	++	++	++	++	++	++	++	+	*	—		
		P	5-16	90	12.5	3		++	++	++	++	++	++	+					
			5-17																

Legend: — = No discoloration.
* = Slightly different from control but not a definite pinkish discoloration.
+ = Very slightly pink, a degree of discoloration discernible only when specimen is carefully compared with normal sample.
++ = Slightly pink, color detectable without aid of normal sample but readily apparent when comparisons are made.
+++ = Pink, color readily apparent without resort to comparisons.
++++ = Very pink, same as +++ except more intense discoloration.

Other data: (a) = Nursing twins.
(b) = Substituted G-20, see text.
(c) = Vetrothiazine doses contain equivalent amounts of phenothiazine N.F.

mercial product, Vetrothiazine (Van Zante*) containing 72%** phenothiazine N.F. and 22% Vetrobon (carob flour).

Six goats were each given 52.08 gm. (37.5 gm. phenothiazine N.F.) of Vetrothiazine in capsules; goats G-9 and G-11 were given the product in a single dose, goats G-13 and G-14 in two daily doses of 26.04 gm. (18.75 gm. phenothiazine N.F.), and goats 206 and 294 in three daily doses of 17.36 gm. (12.5 gm. phenothiazine N.F.). About two weeks later, the same animals were treated in a similar manner except that phenothiazine was given in lieu of the phenothiazine-carob flour mixture. At this time, however, goat G-20 was substituted for goat 206 because of difficulty in obtaining adequate milk samples from the latter; and after completion of the observations on small daily doses (*vide infra*), goat G-20 was given a therapeutic dose of the phenothiazine-carob flour mixture in appropriately divided doses in order to permit comparisons of the effect of the two preparations on milk from the same animal.

After a suitable interval, six goats used in the aforementioned therapeutic trials were given small daily doses of phenothiazine N.F. in capsules for ten consecutive days; goats G-9 and G-11 were given 1.0 gm., goats G-13 and G-14 2.0 gm., and goats G-20 and 294 3.0 gm. About two weeks later, the same goats were given equivalent amounts of the phenothiazine-carob flour mixture in a similar manner, namely, in daily doses of 1.4, 2.8, and 4.2 gm., respectively, for ten days.

Milk samples of approximately 20 cc. were obtained from all goats immediately before each nursing period. In the low-level trials, however, nearly all samples collected in the afternoon were identical with those collected in the morning; only those that have particular pertinency, therefore, are considered herein. The samples were collected in sterile milk tubes, fitted with sterile rubber stoppers, and stored in a deep freeze. At the end of the test period, all samples were thawed, poured into individual watch glasses, and exposed to the air at room temperature for several hours. The initial sample from each doe was used as the standard for normal coloration because of slight differences in pigmentation of milk. Otherwise, the degree of discoloration was determined by comparing each specimen with representative standards selected from the aggregate samples on the basis of the legend given in table 1. An interval of several days elapsed between each test in order to assure complete elimination of the excretion products.

*The Vetrothiazine used in these trials was supplied by Van Zante Sales, Inc., San Francisco, Calif.
**According to the supplier, the phenothiazine content of this product given on the label is limited to 65% by California registration requirments.

Observations

Therapeutic Doses (table 1). Marked discoloration developed in the milk from all animals that were given the phenothiazine-carob flour mixture in single or divided doses containing the equivalent of 37.5 gm. phenothiazine N.F. Moreover, with one exception (goat 206), maximum discoloration (++++) developed within seven hours and persisted at this level in the 24- and 31-hour samples. Thereafter, the intensity of discoloration diminished progressively in accordance, by and large, with the regimen of dosage. The milk from both animals (G-9 and G-11) that were given the mixture in a single dose was still very slightly pink (+) 72 hours after treatment, and it was slightly off-color seven hours later. The milk was normal in all respects, however, in 96 hours.

Milk from goats G-13 and G-14, given the mixture in two equal daily doses, continued to exhibit maximum discoloration for 55 hours, or, as in the one-dose group, for 31 hours after treatment was completed. The intensity of discoloration gradually diminished and was of little or no consequence after 96 hours. The 103- and 120-hour samples from goat G-14 and the 96-hour sample from goat G-13 appeared to be slightly off-color, but none could be termed a definite pinkish discoloration.

When the total dose was given over a period of three days, maximum discoloration persisted for 72 hours in goat 294 and for 79 hours in goat G-20, or for 24 and 31 hours, respectively, after the final dose. The intensity of discoloration diminished progressively thereafter and was not detectable in the milk of either animal after 120 hours; the last samples showing a definite pinkish

discoloration were collected 55 and 72 hours, respectively, following the last dose. In each case, however, one additional sample showed the slightly abnormal appearance observed in terminal specimens from most animals in the other groups.

Considerable difficulty was experienced in obtaining adequate milk samples from goat 206, and this animal was replaced by goat G-20 (*vide supra*). Curiously, maximum discoloration did not develop in the milk of goat 206 until 24 hours after the second of the three doses had been given. Thereafter, however, the intensity and persistence of discoloration was similar to that observed in the milk of its substitute (G-20).

Marked discoloration developed also in the milk from all animals that were given phenothiazine N.F. in single and divided doses totalling 37.5 gm. In every case, maximum discoloration occurred in the first post-treatment sample and persisted at least 24 hours after treatment was completed. The intensity of discoloration diminished progressively thereafter and was not detectable in the milk of any animal after 103 hours. Moreover, a definite pinkish discoloration was not discernible in any sample collected more than 55 hours after the last dose of phenothiazine was given although some of the subsequent samples showed the slightly abnormal appearance described heretofore.

Small Daily Doses (table 2). Because only minor differences were noted in the intensity and persistence of discoloration that developed in the milk from goats receiving comparable doses of the two materials, the results of individual trials need

TABLE 2. Effect of Small Daily Doses

Weight (lb.)	Treatment Drug	Dose[b] (gm.)	Dates	Discoloration of milk (days after initial dose) 0	(c) 1/4	1	2	3	4	5	6	7	8	9	10	11	12
85	Phenothiazine	1.0	5-29 to 6-7	—	+	+	+	+	+	+	+	+	+	+	+	•	—
95	Vetrothiazine	1.4	6-15 to 6-24	—	+	+	+	+	+	+	+	+	+	+	+	—	
60	P	1.0	5-29 to 6-7	—	+	+	+	+	+	+	+	+	+	+	+	—	
65	V	1.4	6-15 to 6-24	—	+	+	+	+	+	+	+	+	+	+	+	—	
95	P	2.0	5-29 to 6-7	—	++	++	++	++	++	++	+	++	++	++	++	—	
95	V	2.8	6-15 to 6-24	—	++	++	++	++	++	++	++	++	++	++	++	•	—
100	P	2.0	5-29 to 6-7	—	+	+	+	++	++	++	++	++	++	+++	++	•	—
80	V	2.8	6-15 to 6-24	—	+	++	++	++	++	++	++	+	+++	—	++	•	—
90	P	3.0	5-29 to 6-7	—	+	++	+++	+++	+++	+++	+++	+++	+++	+++	+++	•	—
60	V	4.2	6-15 to 6-24	—	++	++	+++	+++	+++	+++	+++	+++	+++	+++	+++	•	—
70	P	3.0	5-29 to 6-7	—	++	+++	++	++	+	++	++	+++	+++	++	+++	+	—
	V	4.2	6-15 to 6-24	—	+++	+++	++	++	++	++	++	+++	+++	+++	+++	+	—

gend: See table 1.
er data: (a) Nursing twins; (b) Vetrothiazine doses contain equivalent amounts of phenothiazine N.F.; (c) 7 hours.

not be considered in detail. A very slight pinkish tinge (+) developed in the milk samples obtained from goats that were given ten daily 1-gm. doses of phenothiazine N.F. or an equivalent amount of the drug admixed with carob flour. The discoloration, detectable only when the milk was compared closely with the control, was noted in the first post-treatment samples (collected seven hours after the initial dose was given) and persisted one day beyond the treatment period. One sample appeared to be slightly different from the control on the second day after the final dose was given, but the different appearance could not be definitely termed a pinkish discoloration.

A preponderance of the post-treatment milk samples collected from the animals on the 2-gm. regimen developed a discoloration (++) that was detectable without resorting to comparisons with controls. The intensity was more variable, however, than that observed with the lower dosage, particularly in goat G-13, which was nursing twins. By and large, the samples from this animal ranged from very slightly pink (+) to pink (+++), although only one sample with each preparation was included in the latter category. No explanation can be given for the single specimen that showed no discoloration after nine daily doses of the phenothiazine-carob flour mixture. The samples collected seven and 24 hours later were judged, respectively, very slightly pink and pink.

At the 3-gm. level, the majority of samples developed a discoloration that was readily apparent without making comparisons with controls. The discoloration varied from very slightly pink (+) to pink (+++), but only four samples were included in the former category. Moreover, two of the four samples showing minimal discoloration were collected from goat 294 two days after treatment was discontinued with each preparation. No discoloration developed in the samples collected on the third day after treatment in either trial.

Discussion

These findings show that the absorption of phenothiazine in dairy goats is not prevented by admixing the chemical with carob flour in a 3:1 ratio. Indeed, when therapeutic treatments were given in single or divided doses, the milk from all animals contained excretion products and developed the characteristic pinkish color on exposure to air. Moreover, the intensity of the discoloration was similar to that observed following the administration of equivalent doses of N.F. grade phenothiazine, and there was no apparent delay in the appearance of the excretion products in the milk. The carob flour apparently retarded elimination of the drug, however, because in nearly every instance the discoloration persisted longer at maximum levels than when only phenothiazine was given. Furthermore, the milk continued to show detectable amounts of the excretion products for a slightly longer period in almost every case. Although some differences were noted in the intensity of discoloration that developed in milk from goats nursing either one or two kids, and presumably having different milk-producing capacities, the results were variable and of doubtful significance.

Similar findings were observed with small daily doses of the two preparations, although differences between the two products were less pronounced. It is of interest to note, however, that discoloration of milk from animals receiving 1-gm. doses of the two preparations occurred more uniformly in these trials than in those described in the earlier report[1]. This may be attributable to the continuous nursing of the does in the aforementioned investigation, which probably permitted a more rapid and complete removal of the excretion products between collections of the milk samples. In this connection, however, the possibility of greater absorption of the more finely particulated phenothiazine products in present-day usage cannot be discounted.

Summary

In limited trials, carob flour, an intestinal adsorbent, did not prevent the absorption and subsequent elimination of phenothiazine in the milk of dairy goats when admixed with the drug in a ratio of approximately 3:1. The animals were given the mixture in

Continued on page 449

Dr. Kenneth B. Haas, Sr.

The consuming problem of client relations has been, from time to time, absorbed with sporadic rear-guard action at various levels. Doctor Haas, educator, lecturer, and author (co-author of BUSINESS PRACTICES IN VETERINARY MEDICINE*) argues that the effective level is the proper level. In veterinary medicine, client relations must start with the practitioner.*

Some Principles of Client Relations

KENNETH B. HAAS SR., Ed.D.

Department of Marketing
Loyola University
Chicago, Illinois

VETERINARIANS, not unlike other practitioners of the healing arts, command an oblique view of the doctor-client relationship. By training they have concerned themselves almost exclusively with the physiological aspects of the most complex mechanisms in the world. As such they have come to understand and treat their charges with an aplomb that has earned for the profession the respect of the community in which they serve. Unfortunately such competence does not always attend the veterinarian's dealings with clients.

No practitioner can be successful without a working understanding of his clients. Clients can sting and bite and corrode the sheer thrill of having a successful practice, or they can underwrite the fullest satisfaction in being a practitioner.

The noted British philosopher, John Cowper Powys, once described a truly intellectual person as one "who has the genius to grasp the fact that it is a curious experience to be alive, so curious in fact that it is madness not to sacrifice everything to get the full taste of it."

Because of the nature of his work, a practitioner can not get the full taste of life without understanding people. People are much the same everywhere. The accidents of their education, economic status, and nationality can not rob them of the same loves and hates, ambitions and failings — in short, prides, pains, urges — that normally characterize the veterinarian's own march through life.

It is redundant to note that the cold, brisk, abrupt, superior and impersonal attitude toward clients is on the way out. Clients are laymen to the veterinarian in the same sense that the veterinarian is a layman to the plumber, journalist, economist, preacher, or TV star. The attitude instinctively embodied in the term *layman* can only damage practitioner-client relationship. A wise practitioner will never use it. It must be pointed out that first, last, and always, satisfied clients provide the basis for professional success.

Depth is Needed in Human Relations

The personal touch in relations with clients requires depth in thinking, attitude, and emotion. From a psychological point of view, belief is the first element of depth. Essential is belief in one's own ability to cope with client problems. There can be no substitute for the magic of self confidence.

This is not to say that self-confidence implies "cockiness." It indicates, rather, that self confidence will achieve results in human relations. A veterinarian's confidence is usually evidenced by (1) sagacity in expressed opinions, skills, and performance as well as diplomatic presentation of suggestions to a client; (2) and full understanding of how to win confidence and persuade clients. The successful practitioner is well liked. His smile comes easily and naturally. His cheerfulness makes him a pleasant person with whom to do business.

Lack of confidence in the veterinary profession is analogous to driving a car with the emergency brake on. Fear holds back many practitioners. They are afraid that the client may not approve of their treatment, and they are unwilling to ask for approval. Fear can make the practitioner's job an unbearable one.

Imperturbability, then, constitutes the second element of depth, because a mind at ease generates power. This can be achieved only in the absence of strain and worry. Clients prefer a comfortable person, one with whom they can feel at ease.

It has often been said that experience is a dear teacher, but that only a fool can learn by no other. Any veterinarian who practices his art for more than a few years will certainly learn through experience the points that a wise student can assimulate now.

The astute practitioner learns that it does not pay to be a sensitive soul, that he who loses his temper loses out, and that the traditional grouch is not to be taken too seriously. He learns that a chip on the shoulder is merely a free ticket to conflict, and that unpopularity haunts the purveyor of gossip.

Even a modest student of human character soon discovers that the miscellaney of clients are as human as fellow practitioners, and in many cases as accomplished in their own fields as the veterinarian is in his. They understand the calculus of failures and the percentage of successes that attend the practice of veterinary medicine. They do not expect miracles or free service.

But the real credit to his profession is the practitioner who sympathizes with the client, perhaps remembering similar bewilderment a few years back.

Reciprocal Action

Another element in the depth required for adequate human relations is reciprocal action. Clients trust and appreciate their veterinarian in exactly the same way that the veterinarian exhibits concern and esteem for them. The law of reciprocal action is always in operation. It is no less than sound client relations to acknowledge and elevate the feelings of self importance of a client. Clients seldom fail to reciprocate.

Rules for reciprocal action are elementary:

1. Build up clients, not only because they are liked, but also because they exhibit potential.
2. Make clients feel important by genuine praise.
3. Be a good listener.
4. Speak in terms of a client's wants, needs, and desires.
5. Reassure the client.
6. Explain, never argue.
7. Pronounce names correctly.
8. Be business-like.

Personality Obtains Reciprocal Action

Some veterinarians bring to their profession a kind of personality that instantly puts the client at ease. They have a genuine smile and a friendly manner that melt away suspicion or indifference, and win favor instantly.

But most practitioners are just average people. The problem with which they are

confronted when they try to sell themselves seems quite different. Actually the problem is no different. To be sure, a more dedicated effort is often required, the first step of which must be to take a real interest in each client's problem. A client who knows quickly that he has come to the right man is instantly "sold."

The Open Door To Success

Odd as it may seem, the simplest yet most important part of the practitioner's problem with clients frequently bewilders even versatile practitioners. A client's trust and patronage can be won through an appeal to reason, education, or special interest. Or it can be won through an appeal to sentiment.

Since time is an important factor in any practice, the obvious approach is embodied in a tactful appeal to sentiment. The process can be alarmingly simple — a pleasant greeting, careful handling of the animal patient, business-like attention to details normally developed through interrogation, and a sincere compliment for the owner's possession.

Clients nearly always respond to an appeal to their feelings, whereas an appeal to reason is fraught with danger. But emotions are not readily stirred with drab, matter of fact recitals, or superior-toned dismissals of apparently ignorant questions. Emotions are moved by build-up and dramatization.

Successful salesmen have noted that there is a great sales advantage in making people feel important. Psychologists similarly have demonstrated that the feeling of importance is essential to a client's self respect. Veterinarians who accept this fact together with the proper implications can make their "selling" easier and more productive.

Praise can be used as an integral part of a practitioner's client relations program. It must be remembered, however, that although a sincere compliment can gain favor, still there is danger in its use. Genuine praise poorly delivered, or obvious flattery warn the client of an impending "buttering-up process," and are therefore doomed to failure. One lacks plausability, the other sincerity. Both deserve to fail. On the other hand, there are forms of subtle, favor-winning compliments that can satisfy the client's desire to be important and gain favor for the veterinarian at the same time.

A good listener pays his clients the finest compliment by simply listening. It is a courtesy with a double purpose, since it not only compliments, but at the same time elicits some of the information required for diagnosis and indicated treatment. It is not an aphorism to note that "You can often listen your way to acceptance when you can't talk your way to it."

This is not to say that the veterinary practitioner should cultivate a supple spine, or become a mute sycophant. It does indicate, however, that conversation should proceed in terms of the client's wants, needs, and desires. Clients are entitled to know how the animal patient will benefit from the indicated treatment, and they are entitled to have that information promptly. Most clients like to consider themselves busy, their time valuable, and they appreciate the consideration displayed when a veterinarian makes a point of saving their time.

Clients also appreciate assurances. They do not want to put their pets or livestock into the hands of anyone who does not sympathize with them. They want definite statements, not vague dismissals.

Nor do clients appreciate the affront of having their names pronounced incorrectly. The one thing that a man really owns is his name. It is important to get it right, pronounce it correctly, and use it often.

Assessment of Fees

Assessment of fees is always a problem. A client who believes that he has been overcharged can not be calculated to return for future services. Surprise and anger, however, will seldom arise when the doctor and client have had a frank discussion about fees before service is given.

Many clients are timid about asking the price in advance. Later, when the bill arrives they are disappointed and angry. If the fee is mentioned in advance together with an explanation of "how and why," few complaints will be forthcoming.

Behavior Patterns

In a certain sense of abstraction, all clients are alike. But at the level of functional operation, there are many differences. Those involved in discussion are usually characterized as problem clients. Suggestions for handling some of these problem clients must of necessity by vague, but the discerning practitioner can readily appreciate that these suggestions are rarely clear-cut in their application to behavior patterns.

1. Behavior: Decisive.
   Diagnosis: Confident, positive, conclusive, opinionated, "big feeling."

Treatment: Exercise self control, be tactful, be brief, ask questions, seek opinions on all important points, use full medical terminology, show tentative plans for treatment, and induce the client to help.

2. Behavior: Deliberate.
   Diagnosis: Characteristically slow and cautious, believes he knows the veterinarian's job, weighs the values, is self possessed and careful about money.

Treatment: Take plenty of time, give opportunity to think it over, cover points slowly and in order, be patient and cautious, use full medical terminology, demonstrate course of action.

3. Behavior: Impulsive.
Diagnosis: Impatient, nervous, excitable, possibly unstable, acts on impulse.

Treatment: Exhibit quiet action, hit high spots, refrain from debate or arguments, and move rapidly to complete the deal.

4. Behavior: Indecisive.
   Diagnosis: Puts off action, but is willing to listen, usually affable, and has a hesitating manner.

Treatment: Give positive suggestions, offer help, help client decide, and be tactful.

5. Behavior: Silent.
   Diagnosis: Has little to say, appears indifferent, an obvious introvert.

Treatment: Gain confidence, explain the treatment, ask questions about minor points, watch for signals, be honest, tactful, straight forward.

6. Behavior: Stubborn.
   Diagnosis: Inflexible, obstinate, contrary, opinionated.

Treatment: Let the client talk, be patient, suggest action but let the client decide, ask questions, listen, demonstrate, use professional terminology, work fast.

These are only some of the more common behavior patterns. Other common patterns are as follows: Suspicious, timid, fee conscious, argumentive, irresponsible.

Nothing in the veterinary profession can take the place of good human relations with clients.

Talent will not. Nothing is more common than unsuccessful practitioners with talent.

Education and knowledge will not. The world is replete with educated derelicts.

Genius will not. Unrewarded genius has become a legend.

Hard work will not. People have killed themselves with work and accomplished nothing.

Good human relations and their persistent use are almost omnipotent. They have solved, and will solve, most of the pressing problems of the human race.

Presented at the 28th annual meeting of the Florida State Veterinary Medical Association, Clearwater, Fla., Oct. 13-15, 1957.

Chick Survives Head Transplant

Six chicks that survived an operation in which head tissue was transplanted from another breed before the chick embryo's circulation system was established may help uncover secrets of tissue and cell differentiation, according to Yale University scientists. It has been suggested that early in embryonic development tissues of different hosts are compatible, since one head took the place of a second one. Tissue differentiation appears to develop after the circulatory system is developed. Similar transplants may be possible in mammals.

SMALL ANIMAL PRACTICE

How would YOU diagnose this?

CASE NO. 3 Female Pekinese, two and one-half years old. Symptoms: posterior paralysis. Patient had suffered a similar attack about four months previously. Defecation was difficult. Had previous record of constipation but now more severe, according to client.

Dog exhibited considerable pain in rear quarters when moved. Radiograph revealed source of pain and inflammation. How would you diagnose and treat this case? For diagnosis and news of a dramatically successful regimen for similar cases, turn to page indicated below.

turn to page LIX

Dr. T. H. Brasmer

Clinical nutrition is a therapeutic concept which employs the principles of nutrition as a valuable instrument to provide and maintain health. Today sick animals are benefited by carefully considered diet therapy. Proper and adequate nutrition under situations as pertain to hospitalized pets is as important to satisfactory recovery from illness as the choice of drug therapy.

A Plan for Feeding Hospitalized Patients

T. H. BRASMER, D.V.M., A. R. TWARDOCK,* D.V.M. and M. F. COX,** B.S.

Danville, Illinois

A few years ago, aseptic surgical technics were regarded as impractical, too expensive and unnecessary in small animal practice. A few years ago the practical value of clinical laboratory work seemed open to question. A few years ago, some practitioners did not believe a microscope or an *x*-ray machine was worth the investment. What are some of the things some veterinarians do not believe in today?

In 1957, the writers critized individualized hospital feeding. When the premise taken was reviewed later, it seemed dogmatic and an example of failure to keep an open mind for improvement of hospital care of animal patients.

Was systematized feeding unnecessary if it improved the nutritional status of patients?

Was an organized feeding program impractical if it resulted in a reduced mortality rate?

Was it too expensive if it fell within limits the public would accept?

These questions could only be answered with another — how much time and effort is at present devoted to hospital feeding in comparison to its importance?

The busy practitioner frequently relegates feeding chores to well intentioned, but poorly informed lay help. "All purpose" commercial feeds are utilized in many instances on a hit and miss basis, with little concern for the wide variety of nutritional demands of the hospital population. Cost, convenience and commercialism are often the criteria for diet preparation, rather than the nutritional needs of the individual case.

Clinical Study Initiated

The purely clinical study reported here was initiated as a self-improvement program in our own hospital. Our technics and results are presented as only a first step to solution of the problem. Because results have appeared dramatic, we feel they are

*Doctor Twardock is now engaged in graduate study at New York State Veterinary College at Cornell University, Ithaca, N. Y.

**Mr. Cox is a veterinary student at Colorado State University, Ft. Collins, Colo.

worthy of presentation at this early date.

Obviously veterinary practitioners can not become biochemist-nutritionists. Nor is it feasible for the clinician to attempt the manufacture of animal diets from basic ingredients. With these facts in mind, a group of special diets of proved nutritional and therapeutic value were selected from those commercially available. These canned Prescription Diets were, however, not suitable for some hospital patients. A basal ration that could be developed into a variety of diets was needed. For this purpose a foundation product (f/d) developed by Dr. Mark L. Morris and marketed by the Hill Packing Co., Topeka, Kans. was selected. This basal ration was essential since ingredients of known composition and constant nutritional value are guaranteed. By the addition, in varying quantities, of selected fresh food items, this foundation ration can be supplemented to furnish a wide variety of menus suitable for most hospital needs.

Purpose of Study

The objective of the study undertaken was to develop a program for hospital feeding that would satisfy five arbitrary criteria:

1. The ration must be acceptable. Regardless of its nutritive value, no diet has value if left in the feed pan.

2. The food must have a high order of digestibility. A diet producing copious loose stools, diarrhea, or vomiting is obviously undesirable.

3. Products and technics for preparation and serving must remain within a limited sphere of practicability. Hospital assistants in our practice, although willing, are not trained dietitians. They are required to prepare, mix, and feed all menus without serious disruption of hospital routine.

4. Menus must be nutritionally superior. For this information dependance was placed on the published data of Morris and associates.[2] In addition, critical personal observation of all patients on discharge with respect to weight, condition, hair coat, et cetera, were expected to furnish guide lines.

5. Finally, the program had to remain financially sound. It was realized from the beginning that expenditures would be greater than the formerly employed horsemeat commercial meal type program.

Diet — The Clinician's Responsibility

Past experience has emphasized that individual diets must be specifically ordered by the clinician in charge. Our cage cards provide space for a record of the type of feed, amount per feeding, and frequency of feeding (see fig. 1). These orders are easily abbreviated so that "f/d II-2 cups-2" becomes f/d menu type II, two cups per feeding, feed twice daily. This leaves no reasonable room for employee error. It is equally important that the individual feed chart be an integral part of the case card and that it remain either on the patient's cage or in the same room. Thus clinician and hospital assistant can immediately correlate the condition of all patients, diet ordered, appetite, bowel movements, and progress at a glance.

Three feeding periods daily have been our rule for some years. This provides adequate frequency of feeding for all but the youngest of puppies. Our experience has shown that even in mature dogs two feedings daily are advisable. Control of noise, better feed consumption, better digestability, better weight control, and more rapid recovery rates are only some of the advantages of multiple daily feedings. Some patients are by habit night feeders; others are day feeders. Multiple feeding keeps all of them satisfied.

All food is fed in waxed food trays which are inexpensive, sanitary, and easily handled. Our cost accounting system surprisingly reveals a substantial daily saving where disposable trays are used. Water pans are kept in the cage at all times, rinsed daily, and sterilized by chemical means between patients. These two factors have virtually eliminated the spread of infectious diarrhea.

A trial feeding program was initiated in June 1957, and control work continued until September. During this period, a rather complex charting system gave an accurate control of all statistics presented

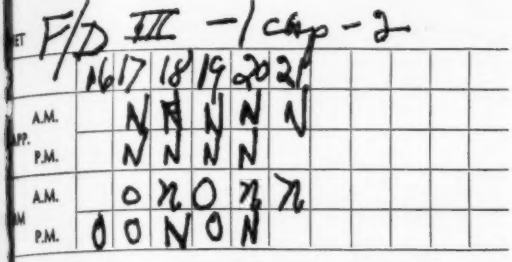


Fig. 1. Lower portion of cage record card concerned with appetite and elimination.

here. After three months of control and observation, we were sufficiently impressed with the program that it was established as a standard hospital procedure.

Control of Hospital Trials

Eleven menus plus innumerable variations were established as follows: The five familiar Prescription Diets (k/d, p/d, r/d, i/d and c/d) were utilized directly as prepared. In addition, six menus of the f/d group were fed. All of these are prepared from eight basic ingredients: Ground raw horse meat, ground raw liver, chopped hard boiled eggs, cottage cheese, f/d, hot water, corn oil and cod liver oil. By working from a basal ration, the addition of varying quantities of these ingredients produce a variety of menu types for all medical and surgical patients and boarders.

The clinician in charge of the case was able to select from this assortment a menu suitable nutritionally and calorically, and one that proved palatable. Table 1 is an abreviated list of types of cases fed particular menus. It may be observed in this table that several diagnoses are repeated in several menu types. Factors such as age, breed, nutritional condition, and individual tastes prevent any rigid regimen. The variety of menus affords sufficient flexibility to meet most needs.

The first hurdle in the program was a psychological one. It was necessary to convince ourselves that these widely varied menus could be produced by our help responsible for feeding rapidly and efficiently. At the onset, one of us (MFC) actually did all of the preparation and feeding. This was done primarily so that accurate controlled data could be gathered. During the entire period, manhours for mixing, feeding, and cleaning up remained remarkably constant. About three manhours per day were necessary when our hospital census was 35 cases or more.

TABLE 1. Abbreviated List of Cases Fed Specific Menus

f/d I (Maintenance menu)	f/d II (Meat free menu)	f/d III (Growth menu)	f/d IV (Reproduction menu)	f/d V (High fat menu)	f/d VI (Low fat menu)
Board surgery mange accident cases fractures abscess worming eczema wounds	Acute eczema	Fractures young animals infected wounds surgery malnutrition hypothyroidism distemper epilepsy	Eclampsia pregnancy	Chronic eczema	Obese animals chronic pancreatitis

k/d	c/d	r/d	p/d	i/d	Hills Canned Commercial Dog Food
Senile animals (board, surgery, medical) nephritis cardiac insufficiency cystitis cellulitis uremia	Board surgery medical	Obese animals	Young animals tail docks ear trims dystocia fractures	Gastroenteritis hookworm infection	Board gastroenteritis tonsillitis small breed dogs (poor eaters)

When it became necessary to break in our normal lay help on the job, we were amazed how rapidly they were able to take complete responsibility. The time factor has not varied from the three manhours per day average. This includes mixing, feeding, and cleaning up, three times daily.

Table 2 is a reproduction of our f/d menu types including their components, calories per menu, and cups of feed derived from each formulation.

At first glance the mixing appears complicated. However, the entire procedure can be broken down into a few simple steps:

1. The total cups of f/d menus of all types to be fed are totaled from the cage cards.

2. One-half this number of cups of dry f/d are put into a large pan and mixed with an equal number of cups of hot water.

3. Where large amounts of various menus are used, they may be individually mixed in separate containers to prevent excessive packing.

4. The water and f/d are allowed to soak for 30 minutes. During this period all patients on canned menus are fed.

5. After soaking, the required cups of moist f/d for each menu (total from cage cards) are measured into separate containers — one for each menu type used.

6. A little simple arithmetic will then give the amount of additional protein, fat and cod liver oil to be used in each menu type aggregate amount.

Fig. 2. Diet cart employed at the Hillcrest Hospital for Animals, Danville, Ill. Note disposable waxed trays used for feeding.

It will be noted that following this technic will produce about 10% excess of feed of each type. This feed is utilized by two factors: Feed for blood donors and experimental dogs; and by the practice of feeding a slight excess over the amount ordered for each patient.

Palatability

Our next concern was palatability. Over a period of 78 days a total of 530 hospital-

TABLE 2. Menus for Feeding Basal Ration

	f/d I (Maintenance)	f/d II (Meat Free)	f/d III (Growth)	f/d IV (Reproduction)	f/d V (High Fat)	f/d VI (Low Fat)
f/d (cups)	3	3	3	3	3	3
Water (cups)	3	3	3	3	3	3
Meat, lean (cups)	¾		1½	¼	¾	¾
Cottage cheese — small curd (cups)		¾				
Eggs			1	1		
Liver (tablespoons)			4	2		
Fat, liquid, (tablespoons)	3	4	5	4	8	
Cod liver oil (cc.)	6	6	10	8	6	6
Calories per menu	2,160	2,200	2,750	2,140	2,800	1,780
Total feed (cups)	7	7	7½	6½	7	7

TABLE 3. Acceptability of Various Menus by Hospital Patients

Menu type	Patients (no.)	Good Acceptance 24-Hr. no.	%	72-Hr. no.	%	Refusal	Not fed
f/d I	230	209	(95.8)	214	(98.1)	4	12
f/d II	7	6	(85.7)	7	(100)		
f/d III	113	104	(95.4)	108	(99)	1	4
f/d IV	1	1	(100)				
f/d V	1	1	(100)				
f/d VI	1	1	(100)				
k/d	79	74	(96)	75	(97)	1	2
c/d	57	42	(84)	46	(92)	1	7
p/d	14	12	(92)	13	(100)		1
i/d	12	11	(100)				1
r/d	1	1	(100)				

ized patients were fed menus of this group. Table 3 represents our findings on acceptability. It may be noted from table 1 that these were all classes of hospitalized patients. They varied from healthy boarders to critical surgical patients. Obviously patients on intravenous feeding or liquid diets could not be included in this survey. In some instances, a drop off in appetite was observed after initial good acceptance. We did not feel this was a result of lessened palatability. Weight chart results would indicate this lowering of appetite represented an equilibrium between caloric demands and food consumed. In our eagerness, we may often have been guilty of ordering excessive amounts of food.

Palatibility at 24 and 72 hours of hospitalization are presented in figure 3. The 24-hour figure is surprisingly high when one considers that many patients are either physically or psychologically unattracted to food during this initial period.

It should be explained that we did not insist on 100% consumption of all feed for satisfactory acceptance. We felt that any patient consuming 75% or more of feed offered should be considered in the "good acceptance" column.

A previous survey[3] of practitioners using the canned Prescription Diets has shown a high level of satisfactory acceptance. In a poll of 773 veterinarians, 97% found k/d satisfactory from the palatability standpoint. Of a somewhat smaller number polled, p/d proved satisfactory in 94.7% of cases; r/d in 85%; i/d in 92%; and c/d in 77.6%. These figures correlated well with our own experience. Important improvement came to light when data accumulated for f/d menus was reviewed and summarized.

Figures for 72 hours acceptance came as a surprise to all of us. Previous experience with commercial rations had not prepared us for this high, almost universal, palatibility. It should be noted that a small percentage of patients (1%) were changed to other menus due to nonacceptance. Again when it is considered that these were almost always patients in critical condition, the figure appears low.

A total of 27 patients are listed in the "not fed" column. These represent patients that were hospitalized for short periods (less than 24 hours) and due to therapeutic reasons such as worming, surgery, et cetera, never received food. These animals were not included in acceptance figures.

Selection of Diet

The selection of the menu for the patient is a professional job. The clinician must instinctively ask himself the same sort of questions that he uses for the basis of therapy. Is the patient thin, normal weight, or obese? Is it growing, mature, pregnant, or senile? Are there excessive demands being made because of tissue trauma or disease, blood loss, tissue repair, serum loss, fever, or environmental stress? Are digestive processes normal? Are there noticeable nutritional deficits or deficiency symptoms? Are the organs of elimination functioning properly? Are the organs involved in food metabolism under abnormal stress or disease? Most of these questions can be answered by clinical examination and experience coupled with laboratory confirmation. In the majority of cases the proper type of diet or menu becomes immediately evident. In some it may be as confusing as arriving at an accurate clinical diagnosis.

Clinical appraisal of nutritive values are difficult when many patients are hospitalized for less than a week. We were unable to develop an accurate practical measuring tool for this important factor. However, weight gains and losses at least give indica-

tion of caloric balance both in healthy or sick dogs. It was felt that the high quality varied protein available should satisfy amino acid needs. Since both fat and fat soluble vitamins were supplied plentifully, it was felt that these factors were supplied at adequate levels. Nutritional values from a weight basis may be gained from accumulated data which reveal that of 120 dogs surveyed, 58 gained an average of 2.1 lb. per animal. Thirty-five maintained constant weight, and 27 lost an average of 1.8 lb.

Unfortunately entrance and dismissal weights on all patients were not recorded. Dogs, included in survey summarized in preceding paragraph were not preselected, but represent a good cross section of all types, ages, and sex with a wide variety of clinical diagnoses.

Client comment should be mentioned here. For perhaps the first time in our practice career we have heard our owners comment on how well their dog had done while hospitalized or boarded. Their opinion appears invariably based on weight gains or losses. Our lay help has also contributed to our high opinion of this program. They comment frequently on how well a nervous boarder, (Boxer), a growing puppy, or a known feeding problem has done since these menus have been in use.

No chart is necessary when we consider digestability. Vomiting and loose stools as a result of poor feed digestion have not been a problem. When diarrhea or vomiting has been noted, it has been considered a result of the disease problem unrelated to the feed itself.

Cost of Systematic Feeding

Detailed cost sheets were maintained during the three-month trial period. A complete reproduction of experience would be of little value due to variation in local prices. We have, however, been able to develop rough comparative figures that may indicate approximate cost. In order to accomplish this, a 25 lb. dog was selected arbitrarily requiring about 1,000 calories per day. In actual practice, the senile patient on k/d would require far less caloric intake than the growing puppy of similar weight. Similarly, temperament, physical stress, parasites, blood loss, fever, and dozens of other factors would alter this arbitrarily stated amount of feed. Table 4 illustrates the rough comparison. This does not include labor costs.

TABLE 4. Comparative Cost of Various Menus

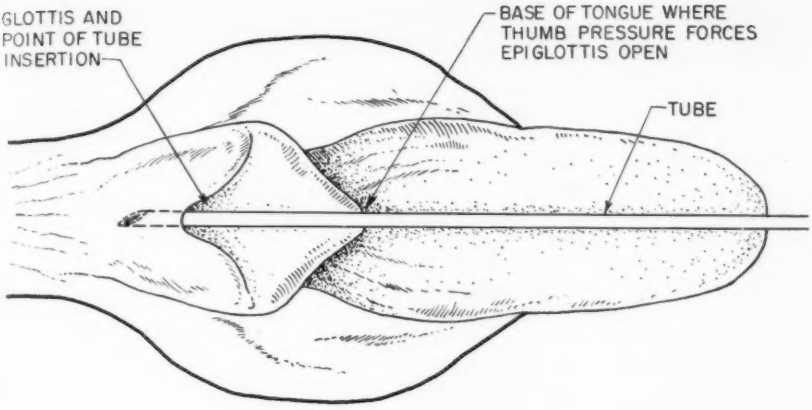
Menu Type	Amount fed daily	Calories (approx.)	Cost (cents)
f/d Menu Type I (maintainance)	3 cups	1000	15
f/d Menu Type III (growth)	2½ cups	915	18.7
k/d	1½ cans	925	30
Canned Commercial Dog Food	1½ cans	900	21
Commercial Meal (average)	2½ cups	1000	8.5

A slightly more accurate cost picture may be obtained by showing total feed costs averaged over a three-month period. During this time, an average of 30.9 patients were fed daily. If labor and utensil costs are neglected, we had an average daily cost of $7.66 and an average cost per patient per day of 24.5 cents. It can be seen readily that there are cheaper methods of feeding hospitalized dogs and cats. However, in an era of corticosteriods, antibiotics, and expensive surgical technics, this cost appears well within the area of practical good hospital management.

Summary

The operation of small animal practice will continue to see many refinements in years to come. None has been more needed than improvements in hospital dietetics. Despite excellent refinements in diagnosis, therapy, and surgery, many hospitals still remain practically in the "cracklin and mush" age of patient nutrition. Our clients have every right to expect that their pets are receiving menus planned as carefully for their individual needs as the medical therapy prescribed. Petty cost cutting and sloppy technics are no more admissable in diet control than in surgery. Two or three days of good nutrition may be worth a week of intensive therapy. Results presented here suggest only a beginning in improving nutrition technic for hospitalized pets. It is hoped and expected that further

Continued on page 434



Endotracheal Intubation of Dogs and Cats

ROLLIN R. SMITH, D.V.M.

Harbor Animal Hospital
Torrance, California

IT is generally acknowledged that anesthesia administered via endotracheal intubation will greatly increase margin of safety to the patient during surgery. Endotracheal anesthesia provides perfect ventilation, consistent anesthesia, a blood- and mucous-free trachea, and a means for applying artificial respiration should respiratory failure occur.

With the use of anesthetic machines becoming more and more widespread in the veterinary field, the old problems standing in the way of intubation have been eliminated. One machine, the Anesthetizer-Vaporizer-Resuscitator unit, an open-circuit unit manufactured by National Cylinder Gas Company, Chicago, Ill., was designed to make endotracheal intubation a simple technic.

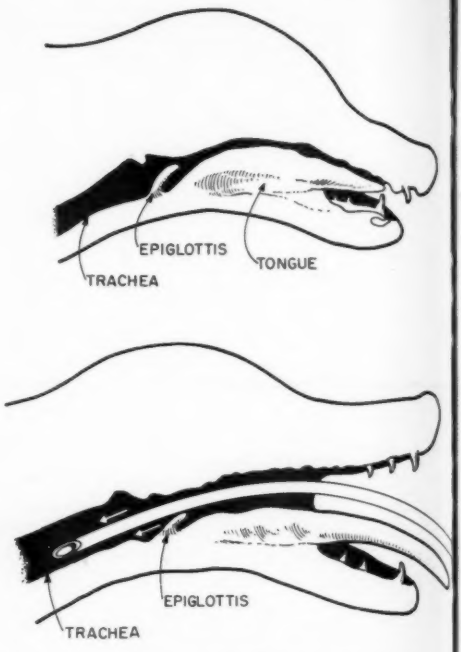
The following is a description of the technic as we use it at the Harbor Animal Hospital: The endotracheal tube should be passed when surgery is being performed on all poor surgical risk patients, particularly the fat English Bull Dogs, Boston Terriers, and older patients, whether an inhalation or an injectible anesthetic is used. Another indication for endotracheal intubation is in instance where the bronchi and

trachea are filled with mucous and other fluids. Intubation allows the fluids to be more readily drained off by suction or lowering of the head below the thorax. Thoracic surgery also calls for endotracheal intubation. Patients that are over-sensitive to injectible anesthetics, and become over-anesthetized, should all be intubated so that the oxygen supply can be maintained as needed. In addition, patients that are in a state of shock during a surgical procedure should be intubated to assure that sufficient oxygen will be easily and readily supplied as needed. Administration of an inhalation anesthetic combined with oxygen through an endotracheal tube and utilizing the AVR unit certainly appears to be best in thoracic surgery and for the poor risk patient.

Passing the Tube

Passing the endotracheal tube in the dog and cat may readily be done if the muscles of the mouth and larynx are relaxed. This relaxation may be accomplished by using short-acting intravenous barbiturates such as Kemithal (Ft. Dodge).

After the patient is sufficiently relaxed, the mouth can be held open by mouth speculum, or by an assistant, and the tongue grasped with tongue forceps and pulled forward with the right hand. This action helps bring the epiglottis into view. With the glottis visualized, the thumb or index finger of the left hand is placed over the roof of the tongue and pressed down to bring the epiglottis into line with the tongue. The thumb is preferred for short-nosed dogs such as Boston Terriers, Boxers, et cetera, whereas the index finger for long-nosed breeds is better. On cats and small-breed dogs, a tongue depressor with a small curve at the tip placed at the base of the tongue will allow the epiglottis to be visualized. The assistant may then press up lightly, under the trachea just posterior to the larynx, which will help open the lumen of the larynx and bring it into a straight line to receive the endotracheal tube. The endotracheal tube is held in the right hand with the plane of the bevel of the tube vertical, to permit easy passage between the two



Sagittal section of dog in normal position (top) and sagittal section with tube in position (below).

arytenoid cartilages, and into the larynx and trachea.

The AVR unit delivers the same exact anesthetic-oxygen mixture to the animal during each inspiration, maintaining an even depth of anesthesia. The mixture can be set or varied instantly. Safeguards are provided in that the surgeon can instantly shift from the anesthetic-oxygen mixture to 100% oxygen at the flick of a valve. When closing the chest after thoracic surgery, one can minimize residual pneumothorax by opening a single valve and changing instantly from automatic breathing to continuous insufflation. During the chest-closing stage, the intensity of insufflation can be adjusted to suit the surgeon. The unit can also be instantly employed to automatically administer artificial respiration during respiratory failure. It will automatically adjust to the volume of the individual animal's lung capacity. The unit signals to the operator instantly if the flow of oxygen is barred from entering the lungs by obstruction.

Auscultation

CHARLES R. WALLACE, B.Ch.E., D.V.M.

Augusta, Georgia

WITH THE INCREASING life span of dogs, cardiac diseases are becoming more and more apparent in small animal practice. Their detection and definition will assist in accurate diagnosis and successful treatment.

Auscultation is one of the practitioners best methods of detecting certain cardiac abnormalities. With an ordinary stethoscope and a little persistence in its use, one can detect insufficiency or stenosis of the valves, abnormal heart rates, abnormal arrhythmias (not sinus arrhythmia), cardiac dilation, pericardial friction rub, pericardial effusion, ectopic systoles, pulsus alternans, and some congenital anomalies as patent ductus arteriosus.

Technic

One approach to auscultation is to stand to the rear of the dog, restraining the animal by gentle pressure on the chest. In this manner, the hand holding the chest piece of the stethoscope can also be used for partial restraint, freeing the other hand for palpation of the femoral pulse. It is recommended that the pulse always be palpated simultaneously with auscultation. This enables evaluation of the pulse characteristics, correlation of heart sounds with the pulse, and the detection of conditions such as pulsus alternans, premature systoles, and thrombosis. Definite thrombosis of the femoral artery was found in three of approximately 300 dogs examined rather closely during the past year. Two of these were noted in hunting dogs and the third in a house pet.

The areas of the chest to be auscultated are the mitral, tricuspid, aortic, and pulmonic areas. These areas and associated murmurs are explained in detail in the references. The mitral area can be auscultated first by applying the chest piece to the left fifth intercostal space a few inches above the sternum. The first (systolic) and second (diastolic) heart sounds are then identified, and the chest piece is moved short distances until the maximum intensity of the first sound is obtained. This technic will allow accurate location and analysis of heart sounds of the mitral area. The aortic area can then be located by moving the chest piece anteriorly and dorsally until the second heart sound reaches maximum intensity. The pulmonic area is located by moving the chest piece downward and forward to a position near the third intercostal space just above the sternum. At this area the second heart sound should be somewhat more prominent, but is often indistinct. The pulmonary valve sound may be loudest just to the right of the sternum, due to the size and position of the heart, and other factors. The tricuspid area is usually just above the sternum in the right fourth intercostal space. The first heart sound should be of maximum intensity at this location. The location of these areas is only approximate, and the chest piece must be moved about to locate the point of maximum intensity of the sound of the valve being auscultated.

The significance of a murmur can best be evaluated by thinking of the valve movements in the cardiac cycle and their associated heart sounds. For example, a murmur with the first heart sound with maximum intensity on the left side over the mitral area may mean that the left auriculoventricular value is insufficient, allowing blood to jet back into the left atrium during contraction of the ventricle. Any such abnormalities detected on auscultation should then be correlated with other symtoms in an attempt to determine the severity of the condition. If, in the example just mentioned, the dog exhibited some coughing and pulmonary rales, with a weak to moderate femoral pulse, one would know that the valvular insufficiency was severe.

Continued on page 439

Canine Distemper

ELIJAH BOWEN, D.V.M.
ALLEN WOLFF, D.V.M.
Alma, Michigan

Cooperation among neighboring veterinarians can account for an exchange of ideas second only to the exchange available in professional journals, according to Dr. Elijah Bowen and Dr. Allen Wolff, both of Alma, Michigan. Since both practice only seven miles apart, they sometimes see the same patients and deal with the same clients.

Recently a 25 lb. Cocker Spaniel bitch was presented for treatment. The animal had not been vaccinated for canine distemper and was exhibiting signs typical of the distemper syndrome. The bitch was medicated through the fever stage successfully. In order to prevent chorea, as suggested by Emele *et. al.*,[1] 250 mg. mepazine (Paxital—Warner-Chilcott) was administered and 500 mg. was dispensed to be given the next morning and the following night by the owner.

Complications

Since the attending veterinarian was ill the day after the initial treatment, his colleague was summoned by the frantic client. The dog had developed hysteria and was walking blindly into walls. It walked continuously and aimlessly and was snapping and snarling and refused food and water.

Recalling a recent article by Schnelle,[2] the second veterinarian on the case treated the dog with 100 cc. 5% dextrose subcutaneously. In four hours the dog appeared normal.

As with Schnelle's experience the proper therapy was questionable. Barbiturates were believed to be contraindicated as were analeptics. Dextrose was given to produce diuresis.

Since both practitioners were avid readers of veterinary journals, there existed a ready index to treatment that might otherwise have been ignored. It must be noted, however, that other animals in both practices have been successfully treated with mepazine without ill effects and without post-distemper encephalitis. Apparently an idiosyncrasy exists among some dogs. (Two other dogs given Paxital prophylactically at a later date developed chorea. Experiments are now being conducted in both clinics with Rutal [Pitman-Moore]. Obviously, experiences thus far are inconclusive.)

The Record

It is important that failures as well as successes be reported in the literature so that all practitioners can profit from them. In this case two practitioners cooperated on a single case, albeit in different practices. And both have continued to consult with each other on other cases.

Unfortunately, the patient subject of this report developed chorea, became aggressive and unsuitable as a pet despite tranquilization.

REFERENCES

1. Emele, Jane Frances, *et al.*, Mepazine in the Treatment of Canine Chorea. *Vet. Med.*, 52:599 (Dec.), 1957.
2. Schnelle, Jerry B., Hysteria in a Dog from Overdosage with Mepazine. *Mod. Vet. Prac.*, 39:140 (Jan. 15), 1958.

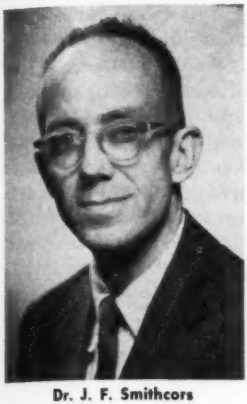
A PLAN FOR FEEDING HOSPITALIZED PATIENTS

Continued from page 430

improvements will continue to evolve so that standardized, versatile, and complete dietary control will be the normal procedure in small animal hospitals.

REFERENCES

1. Morris, Mark L., Handbook for Prescription Diets. Published by the author, 1957.
2. Morris, Mark L., Development of a Basal Ration for Hospitalized Dogs. *Vet. Med.*, 51:373 (Aug.), 1956.
3. Morris, Mark L., personal communication.



Dr. J. F. Smithcors

In this the author concludes the story of one of the most ubiquitous zoonoses in the world (see Vet. Med., *53:149 [Mar.]; 53:267 [May], 1958). The details of that story have reached back to pre-Mosaic Babylon and swept forward to modern America. Rabies continues as a devastating health problem in most parts of the world, and persists as a danger in the United States.*

The History of Some Current Problems In Animal Disease VII. Rabies

J. F. SMITHCORS, D.V.M., Ph.D.

College of Veterinary Medicine
Michigan State University
East Lansing, Michigan

Part 3 (Concluding)

Outbreaks in America

The rash of outbreaks of rabies in America toward the end of the 18th century brought forth a number of works on the medical aspects of the disease in man, but little overt thought was given to the larger public health aspects of the problem. Robert Hamilton published a treatise on *Mad Dog Bites* in 1785; James Mease, *An Essay on the Disease Produced by the Bite of the Mad Dog or Other Rabid Animal* in 1792, and *The Bite of Dogs* in 1801; Benjamin Rush included a section on Observations upon the Nature and Cure of the Hydrophobia in his *Medical Inquiries and Observations* in 1805; and James Thatcher published his *Observations on Hydrophobia* in 1812, in which he counseled confinement, rather than killing the offending dog. In addition to these, numerous articles appeared in medical and other journals.

Other than detailing the history of these outbreaks, and giving acceptable prophylactic treatment for bites, the mission most of these writings might have had is obscured by theoretical considerations of causation and cure. Thus the eminent Benjamin Rush mentioned the bite of a rabid, or merely "angry," animal as one of the 21 causes of hydrophobia — including cold, heat, thirst, worms, epilepsy, tetanus, typhus, et cetera. As indicated above, Mease was one who took exception to these ideas and insisted that rabies could be communicated only by the bite of a rabid animal.

The town fathers of Boston had become sufficiently alarmed over the menace of rabies by 1784 to appoint a committee "to consider the danger the People at large

are continually exposed to, by the large number of Dogs, going at large in this Town." The Committee reported that "many Persons, not only in this Town, but in other parts of this Commonwealth, have been bit by that Animal, and some have lost their lives." While they requested instructions for framing a dog law, it is not clear what action, if any, was taken at this time. Although rabies is known to have been epizootic in foxes in Massachusetts during the first decade of the 19th century, and the infection was certainly not unknown in dogs, the disease appears to have declined markedly in its incidence in man after 1810.

The *Report of the Sanitary Commission of Massachusetts* for 1850 records only one death from rabies in the period from 1810 to 1820, and no additional cases to 1850 in a mortality table classifying more than 115,000 deaths. There are at least three explanations for this: Inadequate reporting, an extended low point in the natural cycle of the disease in dogs and wildlife, or the existence of adequate control measures. In the absence of proof that the latter was the case, either of the former two explanations would appear most logical; effective dog laws were a rarity before the latter part of the 19th century.

Pennsylvania had enacted a dog ordinance as early as 1809, primarily to combat the destruction of sheep by dogs, but how well this was enforced is a moot question. A letter from a Peter Minor to Thomas Jefferson in 1811, in which Minor proposed a dog law for Virginia similar to that in Pennsylvania, together with Jefferson's reply, is of some interest although again there is no indication as to what action, if any, might have been taken. Minor was concerned primarily with the protection of sheep, although he adds, "But Independent of their propensity to destroy Sheep, why should we not endeavor to diminish a race of Animals which to make the best of them are a nuisance, but when considered in a state of madness are certainly as great a curse as can visit us."

To this Jefferson replied: "I participate in all your hostility to dogs, and would readily join in any plan of exterminating the whole race. I consider them as the most afflicting of all the follies for which men tax themselves, but as total extermination cannot be hoped for let it be partial. I like well your outlines of a law for this purpose: but should we not add a provision for making the owner of a dog liable for all the mischief done by him?" Jefferson may have been an astute agriculturalist as well as an able public servant, but it is doubtful that the public would have shared his sentiments on the dog question.

An early case which reached the courts involving the damage done by a rabid dog is detailed in the *Sporting Magazine* for 1810. A dog which had been bitten by another and tied in a cellar by the owner bit a child. The dog and later the child died of rabies, whereupon the parents brought suit for medical and funeral expenses. According to the judge, "A cause like this never, perhaps, before occurred in a court of justice." He ruled that it was not sufficient to merely take precautions to prevent mischief. "A person who knowingly keeps a vicious, dangerous animal, should be considered to be answerable for all the acts of that animal." The jury awarded the plaintiff 36 pounds.

The Rabies Problem in America

Veterinary writings in America are not only scarce at this period, but have little to say about rabies. One of the more prominent early works to give attention to diseases of animals other than the horse was *The Gentleman's New Pocket Farrier* (1833, and numerous later editions), by Richard Mason, M.D. The 1851 edition has five pages on rabies in the dog, taken mostly from Blaine's *Canine Pathology;* unfortunately, in the two pages Mason devotes to means "to prevent the canine madness" he follows the *Natural History* of Pliny and Daniel's *Rural Sports* in recommending "worming" the dog. This he asserts will not prevent the disease in the dog, but will prevent his communicating it to other animals or man. Directions for performing the operation are given.

One of the reasons for the American public adopting an indifferent attitude

toward the rabies problem, especially during times when rabies was not common, may be found in the American edition of Youatt's book on *The Dog* (1848), edited by E. J. Lewis, M.D. Youatt, of course, wrote intelligently upon the matter, but much of the good influence he might have had was negated by the editorial comment which was added. Lewis wrote: "To allay the feelings of many of our dogkilling citizens, we will not hesitate to assert that we do not place as much credence in the frequency of rabies as is generally done . . . the accounts of this much-dreaded malady are greatly exaggerated both in this country and in England . . . the great hue and cry made every season about mad dogs, is more the result of ignorance and fright than of reality."

Lewis contends (on "reliable" hearsay evidence) that a number of the first cases reported in Philadelphia in the late 18th century were actually cases of strychnine poisoning. And further he notes that "the statistics of this affection show a very considerable ratio in favour of escape from innoculation when bitten, or of entire recovery even after the development of the disease."

Comment upon this sort of writing would seem superfluous, except that at least one nationally syndicated medical writer today issues a similar discourse periodically.

"Stock Doctors"

A succession of "Stock Doctors" followed the numerous "Farriers" that were thrust upon the American stock owning public, and few of either wrote well upon rabies. The long popular *Illustrated Stock Doctor* (ca. 1880), by J. R. Manning, M.D., V.S., contains some ten pages upon the subject. This madness, Manning says "generally arises from the bite of a dog, though wolves, foxes and cats are also subject to it by a spontaneous generation . . . When once the virus has been generated in or communicated to any animal, hot weather, abuse, want of water, want of good food, will produce that feverish state which is so favorable to its development . . . The poison is known to reside in both the spittle and the blood of its victim . . . The remote cause — that which produces it in animals of the dog and cat kinds — we need not attempt to discuss, as it can have little if any practical bearing on the subject in hand." Under the heading of "What to do," Manning states: "This is a disorder of so dreadful and dangerous a character that some of the ablest veterinarians do not hesitate to advise the instant killing of the sufferer; and they refuse to give any directions for attempting a cure . . . Yet it is not improbable that much may be done in the way of prevention after the bite has been inflicted." For a bitten horse he directs the use of the tourniquet when appropriate, followed by cautery and confinement when the animal can be observed. In sheep, "the only preventive is to kill all strange or suspiciously acting dogs. The remedy is to kill the sheep as soon as attacked."

Writing on the disease in the dog, Manning reverses himself and says that "The cause of rabies is not known. Some writers charge it to the absence or deprivation of natural sexual intercourse on the part of the dog. It is notable that the number of males outnumbers that of females in very great proportion, and in rural districts bitch puppies are invariably destroyed owing to the fact of their trouble when in season, and the double tax imposed on their owners in the counties where they are kept, so that the argument is a reasonable one to say the least. Again, wild animals of the canine species, the wolf, fox, etc., are never known to be affected with it unless innoculated."

Manning continues, "We can say nothing in reference to the cure of a rabid dog: the best remedy is the shot gun; but as prevention is better than cure, a remedy is given for warding off hydrophobia when a subject has been bitten by a rabid animal." As preventive measures he directs suction and cautery of all bites, or excision of the wounded part if the animal is known to be rabid. Then follows three pages of "proof" of the efficacy of the "Goodman cure" obtainable from a "highly respected citizen of Philadelphia, a prominent wholesale druggist of long standing, and who is well prepared to judge whereof he writes." The

active ingredient of this cure, says this respected citizen, is inuline, obtained from the root of *Elecampane,* which "neutralizes the virus or poison of hydrophobia . . . I never knew it to fail when properly administered." In addition to its successful use in man, it is also indicated in animals. A number of cows which had been bitten by a rabid dog were divided into two groups, one of which was treated. All of the untreated group "took the malady and died from its effects or were shot," whereas of those treated, "not one of the cows suffered from hydrophobia."

The American Farmer's Stock Book (1884) follows Manning to a considerable extent with one additional bit of advice: "Every bite is not necessarily fatal. After many bites rabies does not ensue at all, but whenever it does, death always follows. No person who has been bitten should worry about it, for this very anxiety always predisposes to the development of the disease."

Eradication

At a time when popular veterinary and medical works were still spouting nonsense on the subject of rabies, James Law (1900) had summarized practically all the real facts about the disease. The restrictions on space in modern texts makes his 33 page dissertation (vol. 4, *Textbook of Veterinary Medicine*) a still-valuable contribution. He states: "Long before the days of pathological bacteriology, rabies was recognized by veterinarians as a disease due to infection alone," and he notes that several countries had eliminated rabies, or prevented its entrance, by rigid inspection and quarantine, or by strict laws requiring muzzling of all dogs.

While he recognizes the merits of an anti-rabies vaccine, if an effective one were to be had, Law considers this as not without disadvantages in that it would require cultivation of the virus: "The most effective way of preventing rabies is to eradicate the virus from the country." Measures less strenuous than this "contribute to the maintenance of the disease by drawing attention from such radical measures as would rid the country forever of the scourge." He urges the adoption of a measure requiring all dogs being muzzled for one year — maudlin sentiment to the contrary. "Such a statute, backed by a penalty in some degree commensurate to the homicidal criminality of the person who would leave his dog free to inflict this horrible disease on humanity, would doubtless be effectual, but some nations have such laws on their statute books, and yet allow them to become dead letters." As a compromise measure he suggests enforced muzzling in any locality where a case of rabies has occurred, and "all stray dogs and all unmuzzled ones should be summarily shot."

Such strenuous measures, however effective, would have been strenuously opposed then, as now, by the public which in general is opposed to regulation of dogs. In fact, a major problem today in some areas is the opposition, upon supposedly philosophical grounds, to the mass immunization of dogs. The elimination of stray dogs and of wildlife reservoirs of rabies poses an additional problem, for there probably will always be persons who object to what they consider unnecessary killing of animals as being a form of cruelty, or as an invasion of the rights of animals.

Rights of Animals

Animals, of course, do have certain rights, among them protection from cruel treatment. But rights imply obligations, and in the absence of an ability to discern the point at which they may infringe upon the rights of others—animals and persons alike —it is manifest that dogs as individuals should have someone to vouch for them, *i.e.,* an owner. How far Law's concept of criminal liability of an owner could be pursued is a moot question, but concerning civil liability as suggested by Jefferson, the issue is fairly clear.

C. W. Hume, in *The Status of Animals in The Christian Religion* (1956) states that while cruelty to animals is a sin, "In order to hold the balance fairly between man and beast it is necessary to make a sharp distinction between killing and hurting . . .

To kill an important being is a more serious matter than to kill an unimportant one . . . [and] human beings are more important than animals." So long as more rigorous measures to control stray dogs and wildlife reservoirs of rabies are not prosecuted, the number of persons and valuable domestic animals that will fall prey to them can be fairly accurately predicted. The steps which must be taken to eliminate rabies are known, and except for immunization, have been known for more than a century and a half. The question of when the United States will be rabies-free is more than an academic issue to the score or so of persons who will die of rabies in the next 12 months, to say nothing of the hundreds who must undergo the ordeal of prophylaxis—without worrying about it "lest this anxiety should predispose them to the development of the disease."

Animal Care Panel

More than 500 scientists, veterinarians and animal technicians from throughout the United States and a number of foreign countries will meet at the Hamilton Hotel in Chicago, December 3, to begin three days in technical discussions of the care of laboratory animals. The occasion is the ninth annual meeting of the Animal Care Panel, an organization devoted entirely to the exchange of information on the care of laboratory animals.

Scheduled on the program are 31 reports by scientists engaged in medical and biological research on methods to improve conditions under which their experimental animals are housed, fed, treated and used.

Subjects for the meeting range from Nutrition of Rabbits to Laboratory Animals in Cardio-Vascular Research. Of special interest will be a report by Mrs. A. S. Monroney, president of WARDS, a newly-formed, volunteer group of citizens and doctors interested in promoting high standards of care for laboratory animals. The name WARDS stands for Welfare of Animals Used for Research in Drugs and Surgery. Last year WARDS raised $20,000. for the expansion and modernization of the animal quarters at Georgetown University College of Medicine and Dentistry in Washington, D. C.

The Animal Care Panel is coming to be regarded as the best answer to opponents of animal experimentation who claim that experimental animals are willfully mistreated.

Gaines Symposium

The eighth consecutive annual veterinary symposium held under the sponsorship of the Gaines Dog Research Center, New York, will convene on Oct. 22, 1958 at the Civic Auditorium in Kankakee, Ill.

Dean C. A. Brandly, University of Illinois, School of Veterinary Medicine, will serve again as program chairman. Six formal papers will be presented allowing time for audience participation at a question and answer session.

AUSCULATION

Continued from page 433

Future care and treatment of the animal could then be prescribed.

It is true that some practice is necessary to become proficient with the stethoscope. One must become familiar with the variety of normal sounds, as well as the abnormal ones. Often the first sound is distinctly split. A systolic murmur may be heard over the pulmonic area during inspiration, but not during the rest of the respiratory cycle. Anemic dogs often have murmurs which disappear when the blood values are brought back to normal.

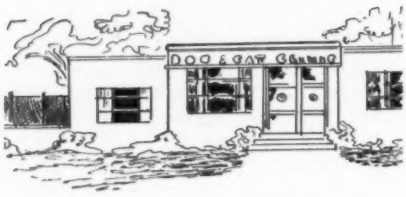
REFERENCES

1. Armistead, W. W., The Heart. Canine Medicine. Am. Vet. Publ., Inc., Evanston, Ill., 1953.

2. Detweiler, D. K., Cardiac Disease. *Veterinary Scope*, 1:8, 1955.

3. Ibid., *Vet. Ext. Quart.*, University of Pennsylvania Bulletin, 125 (1952) & 137 (1955).

CLINIC



CLIFFORD L. McGINNIS, D.V.M.
Peoria, Illinois

Employer and Employee Relations

It matters little what you call them. They can be kennelmen, helpers, attendants, or nurses. I like best to call my assistants hospital attendants. They are an integral part of the phase of veterinary practice that deals primarily with small animals. Generally speaking, everything a hospital attendant does is something you have taught him. His efficiency and ability are in part a reflection of your ability as a director.

I like Ben Porter's remark: "Doctor, I'm a dead duck without hospital help so I try to treat my help like I would want to be treated." We are one of the few forms of private enterprise that is not being dictated to by labor unions. It is quite important that we do not abuse this trust.

Employment in veterinary hospitals has many advantages.

1. Job security is assured because most hospitals enjoy a stable income. Unless an employee really "fouls up," there is little likelihood of a layoff.

2. Pay schedules are usually equal to similar forms of employment in the area. However, there is a limit to the amount that can be paid out in wages while remaining solvent.

3. Sickness and accident insurance for employees and their families are almost a must.

4. Unemployment compensation is mandatory.

5. Paid vacation schedules should be posted well in advance. The pleasure of anticipation always equals the pleasure of several days of living away from home, eating strange food and sleeping in strange beds.

6. Work schedules can be arranged so employees know exactly when they are expected to be on duty.

In a future issue, I will examine some of the marks of a good employee, and take up points on how they can help you in your practice.

Of Human Bondage

In a lecture to a group of medical students Sir William Osler gave this bit of advice, and I believe it can be applied to the veterinary profession as well.

"Engrossed late and soon in professional care, getting and spending, you may so lay waste your power that you find too late, with heart given away, that there is no place in your habit stricken soul for those gentler influences which will make your life worth living."

Collections

The hardest clients to collect from are those whose pets die in your hospital. During the course of the last illness you may have kept the owner informed of progress and reaped some sympathy for your efforts to effect recovery. And yet such clients are slower in paying for professional services than they would have been in the event of recovery.

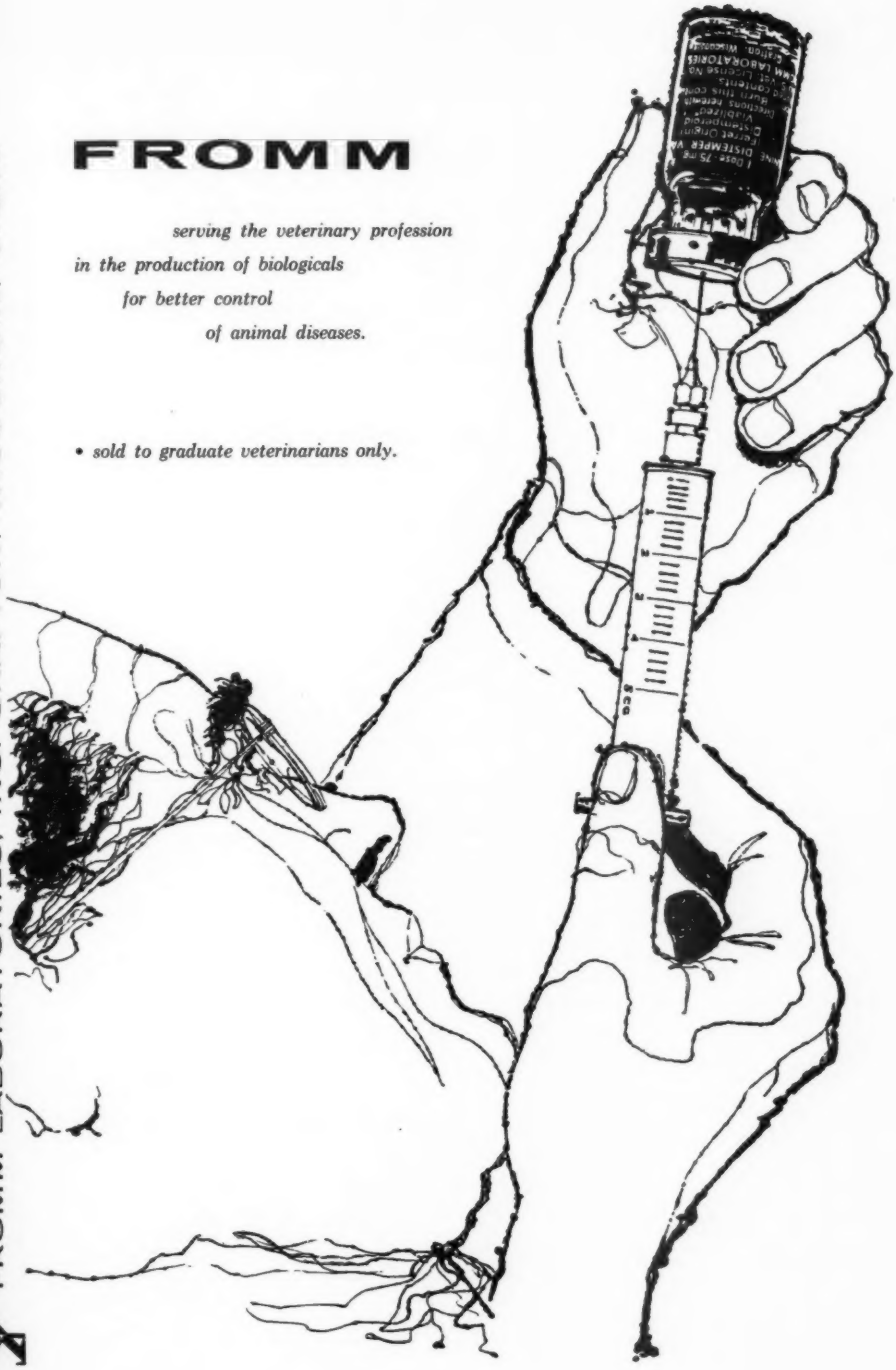
Rules governing collections have been set out in the June issue (*Vet. Med.*, 53:328, 1958). It is well to review them from time to time.

These are general rules, and of course they do not apply in case of hardship, illness, industry layoffs, or to long time, trusted, reliable clients that keep you eating, "God bless 'em!"

FROMM

serving the veterinary profession
in the production of biologicals
for better control
of animal diseases.

• *sold to graduate veterinarians only.*



FROMM LABORATORIES, INC. GRAFTON, WISCONSIN, U.S.A.

Amazing

VITAMIN-MINERAL TABLET FOR DOGS

ARMOUR

New Caminal S

with the canine high palatability factor

dogs love it! beg for it!

TABLETS ACCEPTED FREE CHOICE

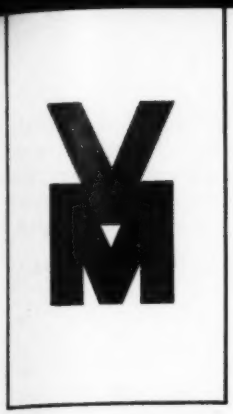
- simple to administer
- excellent conditioning agent for skin and coat
- eliminates problems of finicky eaters
- vitamin-mineral deficiency readily corrected with Caminal S
- sick and normal dogs eat their food with relish

For complete Technical data Write:
Manager Professional Relations
Armour Veterinary Laboratories
P.O. Box 511, Kankakee, Illinois

NOSE TASTE CRUNCH

ARMOUR VETERINARY LABORATORIES
a Division of Armour and Company
KANKAKEE, ILLINOIS

SUPPLY: Bottles of 50 Tablets.



A treatise concerning physiological and morphological aspects of the uterus during gestation. Assembled herein is a diversity of aspects developed during recent years applying to uterine accommodation, influences on gestation, and parturiation as a related series of events.

Gestation Mechanisms

S. R. M. REYNOLDS, Ph.D., D.Sc.

Department of Anatomy
University of Illinois College of Medicine
Chicago, Illinois

WHEN doctors of veterinary medicine of a large area meet, it is appropriate that they give some thought to the basic aspects of their profession. Only so can they hope to comprehend more fully the clinical problems with which they are confronted. So, too, can the standard of veterinary practice be elevated so that generations of veterinarians yet unborn can inherit the tradition which has been enriched by their efforts. Evaluation, to be sound, must be based on a well grounded knowledge of basic physiology and morphology.

The last 30 years have witnessed a particularly abundant yield of results in the area of the physiology of reproduction. So vast has this field become that we must focus our attention on but the smallest part of the whole, namely the nature of essential physiological mechanisms during the course of pregnancy and partuition. Until the time of Heape, in the latter part of the 19th century, knowledge of most reproductive processes was fragmentary at best, and during the lifetime of but one man, Dr. F. H. A. Marshall, a student of Heape, the subject of the physiology of reproduction became an entity. It is one that has yielded a rich body of knowledge of those mechanisms that give rise to the union in mammals of two gametes, and through a series of complicated and interrelated interchanges within the womb, result in living offspring. The discovery in 1917, of the estrus cycle in the guinea pig by Stockard and Papanicolaou served to awaken interest in the United States in the physiology of reproduction. It led to the discovery of the sex and pituitary hormones and the appreciation, still incomplete, of the mechanism of their actions. This whole area of study continues unabated in a number of directions. Scholars in animal husbandry and veterinary medicine, and in gynecology and obstetrics have made enormous strides in the fields of fertility and sterility. Advances have had great medical, social and economic consequences.

As in so many other fields of human endeavor, students tend to break up com-

plex mechanisms into their simpler component parts, and by doing so they hope to achieve a greater understanding of a more complicated whole. There is a tendency in this, however, to become increasingly narrow. We fail to see in this the larger relationships.

The uterus exists to serve three related and interdependent functions. It provides periodically for the reception and implantation of fertilized ova. It grows and adapts to, and so accommodates, the growing products of conception, and it assures at term the delivery of offspring.

Uterine Accommodation of the Products of Conception

There are three main characteristics in the manner by which a uterus adapts itself to its contents during pregnancy. These three phases are called uterine accommodation. One phase, before the time of implantation, is a period of *uterine preparation* through progestational proliferation of all elements in the uterus and of sensitization of the proliferated endometrium for nidation. At this time, the uterus fails to increase noticeably in weight, although there are more cells present in the uterus than before. Immediately after implantation, the uterus begins to grow in size, for its weight, stripped of its contents, becomes progressively greater as time goes on. This is the time of *uterine growth*. There then arrives a time when the uterine growth rate diminishes even though the uterine contents are growing at a rapidly accelerating rate. This is, therefore, a period of *uterine stretching*. These three stages of uterine accommodation, preparation, growth and stretching, are characteristic of all uteri so far studied. The characteristics of the three periods of uterine accommodation vary, however, from one species to another.

At one extreme, for example, the hamster exhibits a period of stretching which lasts but a day and a half; at the other extreme, the guinea pig has a period of uterine stretching which lasts for more than three weeks. Between these two extremes, the period of stretching in the rat lasts four days and in the rabbit eight. Allowing for differences in the length of gestation periods in these different forms, this means that the proportion of pregnancy which the period of uterine stretching occupies varies in an orderly way among the several species.

Just as the development of the products of conception is related to the period of uterine stretching, so is uterine growth related to the products of conception. When, for example, pregnancy is limited to one horn of the uterus duplex, only the horn containing the products of conception grows at first. The sterile horn remains unchanged with respect to size. The reason for this is that the interplay of hormones and uterine distention is such that there is localized growth of the uterus as a function of local distention. Because this is so, we can comprehend that when, in a litter-bearing animal, the size of the litter is small, the amount of uterine growth is also small. Conversely, when the litter-size is large, uterine growth is large, too. This factor of the amount of uterine growth in mid-pregnancy being affected by the size of the uterine contents obviously plays a role in determining the amount of stretching which the uterus is capable of undergoing in the last part of pregnancy during the period of uterine stretching. Thus, the size of a litter affects the size of the uterus and the size of the uterus affects the extent to which the uterine contents can stretch the uterus. Both uterus and its contents, therefore, interact upon each other to affect the span of gestation and the maturity of the offspring.

Uterine Shape During Gestation

There is another important way in which the conceptus influences the uterus. This is the role of its shape upon the course of uterine accommodation. Soon after implantation, the accumulation of fluid in the tiny conceptus forces the uterus to bulge locally in order to accommodate it. This shape is, for all practical purposes, spheroidal. As the conceptus enlarges, the area of distention becomes frankly spheroidal, and the process continues until, at a time which is critical for each species, a maximum radius is attained. Then, within a space of

time marked in hours, the conceptus elongates. It thereafter grows as a cylinder. This change from one pattern of enlargement to another has been called *uterine conversion.* If the uterus is that of a litter-bearing animal with more than one conceptus, the conceptuses come to lie end to end after uterine conversion. In this way, uterine enlargement is through increase in length, with no further significant increase in diameter.

These observations are doubtless familiar facts to many who are acquainted with gestation in domestic animals. There are certain physiological consequences inherent in these facts, however, which are not generally known, and which I want to make clear. They relate to the efficiency of the flow of maternal blood through the uterine wall as the uterus inevitably changes its shape to accommodate its contents.

Uterine Circulation. Three different types of study have shown that maternal blood flows abundantly throughout the uterine wall during the early and middle period of spheroidal uterine enlargement. As the conceptus approaches its maximum spheroidal size, however, the uterine tissues begin to be stretched, and tension develops within them. The tension builds up to a point which is detrimental to maternal blood flow. In fact, in the rabbit on the 22nd day of gestation, when the conversion from spheroidal to uterine enlargement occurs, the tension is so great that an ischemia amounting almost to complete circulatory stasis takes place except in the neighborhood of the placenta. In fact, owing to the special shape of the uterus, blood flow is assured to the placenta at this time.

Conversion from sphere to cylinder, which requires only a few hours, as mentioned, heralds a release of uterine tissue tension and with this, there is re-establishment of the maternal blood flow throughout the uterus. In the final period of uterine accommodation, that of uterine stretching, one might expect that there would be continuing embarrassment in the flow of blood. Nature has contrived, however, by means of a special arrangement of the maternal blood vessels within the uterine wall to minimize the effect of stretching upon the blood vessels at this time. Ultimately, however, near the end of the period of uterine stretching, when the fetus is gaining weight at its most rapid rate, there ensues a second period of uterine ischemia. The flow declines rapidly. What is the significance of these two periods of uterine ischemia in the course of uterine accommodation?

The first period of ischemia is overcome when the uterus changes shape; the second period of uterine ischemia is overcome by parturition. Proper uterine accommodation, therefore, serves to minimize both of these hazards through timely and adequate change of shape on the part of the conceptus. Clearly, any deviation from the normal course of events must necessarily jeopardize the welfare of the unborn offspring, possibly even resulting in its death.

Unity of the Uterine Accommodation Process

I have woven at some length a fabric of uterine function in the accommodation of the products of conception during the course of gestation. I have told you something of how it develops in terms of uterine enlargement, of change of uterine shape, and with respect to the flow of maternal blood through the tissues of the uterus. We have seen how the growing fetus and its associated structures affect each of these things. This, then, is the underlying theme of this paper, namely, that one should not think of the fetus as an entity which is dependent only upon its placental circulation, but rather, along with the uterus, as part of a functional unit in which the uterus, the size and welfare of the offspring and the course of gestation are continually interrelated and interdependent.

How does this concept bear upon those aspects of the reproductive processes with which students of reproduction, animal husbandrymen and veterinarians are concerned? Specifically, how does it relate to the size and number of offspring in a litter? To intrauterine death? To the span of gestation, the maturity of the young at birth and to the onset of labor? In the light of the continuity of the accommodation process throughout gestation, we shall examine briefly each of these aspects of

pregnancy. To do so will enhance our understanding of the extraordinary simplicity of an otherwise seemingly complex and baffling group of unrelated physiological activities.

Fetal Size at Birth. The number of head in a litter is an important economic factor in the breeding of all domestic animals. Experience shows that in some species, large litters are not desirable because of a high rate of loss among the newborn. In other species, large litters are economically desirable because of the number of young which survive. In what way does the gestation mechanism bear on the question of litter size?

Since the work of Hammond, it has become axiomatic to say that in inbred strains of rabbits the smaller the number of young in a litter, the larger the individuals and the more mature they are at birth as well. Conversely, the larger the litter, the smaller the individuals, and the less mature they are at birth. This is true in many domestic animals — so much so that in the mare, multiple births are never seen, for the young are born at too early a stage of pregnancy to survive. This is a fixed tendency which should be borne in mind by those who breed animals for meat, hide, or head.

What kind of physiology is behind this factor? An insight is gained when we examine total conceptus weight in large litters of different sizes. We find that, in small litters having larger fetuses near term, the combined weight of all fetuses approaches that of the total conceptus weight in large litters made up of smaller individuals. There is, accordingly, less disproportion than one might think, so far as the uterus-fetus relationship is concerned. For example, rabbit litters averaging 3.5 young to a litter have a combined weight of 280 gm. or 8 gm. of uterus per fetus, while litters of six young total 484 gm., or 8.06 gm. of uterus per fetus.

The uteri which contain each size of litter vary. In both the small and the larger litters, the uterus increases the same amount in weight, from 2-3 gm. at the outset to about 18 gm. by the 16th day of gestation. Thereafter, the uterus increases about another 10 gm. in the next 15 days. In the case of larger litters having the larger uterine load, the uterus makes one final spurt of growth in the last three days of pregnancy. Less of a spurt of growth occurs in the case of the smaller litters.

On the surface, this is a baffling situation, for it shows that the uterus responds to its load by greater growth, but it does not tell us what there may be in common between the two different patterns of uterine growth which provides a mechanism for the onset of labor. We find the common denominator in one further correlation. It exists as a function relating the weight of the uterus to its contents. When, for each series of data, one divides the weight of the uterus by the weight of its contents, a pair of curves may be plotted from the data which shows that as gestation comes to an end, the amount of distention in the case of both the small and the large litters is about equal. A more striking mechanism may hardly be visualized than this one in which, despite variations in litter-size, in size of uterus, and size of the individuals within the litter, a constant relation exists between the uterus and the size of its contents. Clearly, the whole business of uterine accommodation in the latter part of gestation seems to be concerned with development and maintenance of this relation for reasons which are not yet known to us. It is probably governed by the tissue tensions, and the necessary muscle thickness to develop the power for labor and the hormonal stimuli which come to operate at this time. In any case, it is clear that so far as the physical relations with respect to small or large litters are concerned the same ultimate functional state of the reproductive tract is achieved in both instances. This role of distention, long appreciated as a factor in the gestation mechanism, has never been defined in any unified sense as it is here in relation to uterine accommodation, yet it appears to be a critical factor in the mechanism, so regular is it in form and in magnitude.

Before leaving the question of fetal size at birth, I would be remiss if I did not refer to two further factors that influence the size to the offspring at birth. One is dietary, the other, genetic.

Nutritional Effects. Stated briefly, severe caloric restriction has no effect on the size of the young at birth unless the restriction exists in the last part of pregnancy. It then becomes a determining factor and results in fully developed offspring that are smaller than normal. Restriction early in pregnancy with full diet in the latter part results in young at birth that are of normal size. How the uterus itself is affected under these circumstances is not known, but in view of the relationship existing between this organ and litter size generally, I venture to predict that the role of caloric intake exerts itself through the mechanism of uterine accommodation already described.

Genetic Effects. A genetic factor operating through the mother may likewise be demonstrated as affecting the size of offspring. For example, a Yorkshire stallion bred to a Shetland mare will produce a foal always the size of the pure bred Shetland foal. A foal of such size is compatible with the small pelvic outlet of the mother. A Shetland stallion, on the other hand, bred to a Yorkshire mare will result in a large Yorkshire type foal. We see, accordingly, that something in the maternal uterine environment plays an as yet undefined role in this limitation of size of the offspring. One would do well, I think, to investigate the uterus in such situations rather than be content to say simply that genes do it. They do play a basic role in inheritance, but the physiologists must concern himself with the milieu in and through which they work.

We may accept as a first principle, I think, that the uterus affects the size of offspring, and that the size of offspring affect the uterus. The two entities are mutually interdependent throughout the course of gestation.

Fetal Maturity

Maturity within the Species. One of the lessons of uterine physiology learned long ago is that, the larger the litter, the less mature are its individuals at birth; and conversely, the smaller the number, the larger and more mature are the young when born. The small rabbit pups are always immature, the large one, always quite mature. Why should this be so? The answer is related to the fact that the large litters are commonly born a day or two before their less numerous and larger litter-cousins.

Hammond and Wishart have found that the answer to the problem is rather simple, and a neat physiological mechanism. By using inbred strains of rabbits, these investigators produced one variety which tended to parturition on the 31st day of pregnancy and another variety which came to term on the 33rd day. The first are less mature at birth and smaller than are the offspring resulting from a pregnancy of 33 days' duration. In the latter variety, there is a genetic tendency for the corpora lutea of gestation to remain functional for a slightly longer time in the does exhibiting longer gestation periods.

It is clear that when the last period of uterine accommodation, involving as it does extensive fetal growth, is extended by the presence of corpora lutea which function for a day or two longer. The fetuses are assured of a favorable environment for two important days. In the case of single strains, the large litters tend to come to term at an earlier time than small litters. This is without doubt related, to the fact that they impose sufficient load upon the uterus to develop the critical distention coefficient at an earlier time in gestation than do their larger cousins of smaller litters. In this way, they are born both smaller and less mature than if they had remained *in utero* for a day or two longer.

Comparative Fetal Maturity at Birth. When we consider the relative degree of maturity among the several species, we observe the same kind of mechanism at work. In the hamster, the period of uterine stretching is a mere 1.5 days; in the rat, 4 days; in the rabbit, 8 days; and in the guinea pig, about 30 days. To any one familiar with these species, it is clear that this series, constitutes one of increasing maturity at birth. It is possible to demonstrate this progression of maturity with respect to such diverse phenomena as the degree of ossification, resistance of newborn to anoxia, and to the attainment of control of body temperature.

We see, therefore, that fetal maturity whether within or among the species is related to the phases of uterine accommodation, especially the period of uterine stretching which represents the accommodation by the uterus of a rapidly maturing fetus. We may say as a guiding rule that the greater the proportion of pregnancy that a fetus spends within the uterus after conversion of the pattern of uterine enlargement from sphere to cylinder, the more mature will be the offspring when born. We witness in this a direct association between the conceptus and the uterus in the mechanism of gestation.

Fetal Death

Just as the viability of the fetus depends upon the processes of uterine accommodation, so we may expect that there will be a relation between fetal death and any abnormal tendency in accommodation. This should be pronounced, perhaps, at the time of uterine conversion on account of the attendant ischemia. It is then, as we have seen, at the time of conversion, that profound ischemia takes place as a necessary phase of adjustment of the uterus to its contents, but is nonetheless a potentially critical time.

In order to assess this possibility, counts of resorbing fetuses have been made in a series of rabbits in which the number of dead fetuses was correlated with the phases of uterine accommodation. After implantation and until the 16th day, the number of resorbing fetuses is negligible. As maximum spheroidal size of the conceptus is approached, however, we find an increase in the number of deaths which continues until the 24th day of gestation, by which time the process of conversion is over. The next four days witness no further increase in the number of dead fetuses but toward the end of gestation, after the second period of uterine ischemia commences, there is a second abrupt increase in the number of fetal deaths.

The fact that there actually is an increased incidence of fetal deaths in rabbit litters related to the development of each period of uterine ischemia suggests that fetal death is caused by insufficient blood flow to sustain some of the fetuses. The observation affirms but does not prove that faulty uterine accommodation is related to fetal death at these times. It is, however, a reasonable tentative conclusion, based on observed facts and it reveals again that the interdependence which exists between the uterus and its contents is an intimate one indeed.

The Span of Gestation and the Onset of Labor

One of the mysteries of the ages is the tendency for gestation to last for fixed lengths of time among the several species of animals. There are variations, as in all biological phenomena, but so fixed is the mean duration of pregnancy that physicians as well as breeders of all animals look upon a fixed gestation period as characteristic of a species or breed. In seeking for a factor which governs this, many men have revealed, and are continuing to reveal, a tendency to reduce a complicated process to a very simple basis. They speak of "the cause of the onset of labor." It is widely believed that some factor comes into action at just the proper time and pulls the trigger of the parturition process. We shall see that this is not so. It is no more possible with respect to parturition than it is to have a dramatic climax to a play without carefully building up the dramatic action that leads to the climax.

The circumstances leading up to the parturition mechanism have been outlined. We have seen that the uterine contents grow at an accelerating pace while the uterus approaches a limiting degree of distention. Inherent in this process is a decline in circulatory function which is reflected in a lessened flow of maternal blood in the uterine wall and in a diminishing rate of transfer of water and certain dissolved substances across the placenta.

Other changes likewise occur during the last week of pregnancy which herald impending labor in the rabbit. Most prominent of these is an accelerating increase in myometrial irritability, with a particularly great increase within the last two days of

pregnancy. This irritability may be demonstrated by an increased sensitivity of the myometrium to certain hormones, mechanical stimulation, electrical and pharmacological stimulation, as well as by an increasingly efficient pattern of uterine contraction. At the same time, other factors come into play, also. Increasing uterine distention increases the resting tissue tension, and this favors a greater force of contractions. Behind these more evident changes is the fact that near the end of gestation, actomyosin, the contractile protein of muscle, increases in quantity and it is of improved quality for forceful contraction. Taken together, all these factors develop the hands for labor and provide the coordination of myometrial contractility which make an effective labor possible.

Presiding over all of the forementioned changes are the hormones elaborated by the ovary and placenta. They play a key role. Progesterone, at least in certain species, keeps the brakes on the labor mechanisms until, at a time when the effect of progesterone is effectively diminished, the labor process can begin. Estrogens influence the growth of the uterus and its contractility as well. There are questions in the minds of many workers as to how the necessary relationship for labor between estrogen and progesterone comes about, and what is the pattern of hormone levels in the blood. There is no question of the underlying truth of the qualitative actions of the ovarian and placental hormones, however. Until the pregnancy-stabilizing effect of progesterone is withdrawn, there will be no labor. This hormone is derived entirely from the ovary throughout pregnancy in some species, and from the ovary and placenta, in others. Estrogen, on the other hand, increases in amount and in effective action as term nears. Without proper action and balance of these hormones, labor would not occur and the fetus would die.

Presented at the 40th annual convention of the Southern Veterinary Medical Association, Roanoke, Va., Oct. 27-30, 1957.

Conclusions

There has been presented in the foregoing a number of aspects of uterine physiology and morphology. We have looked at the forms that occur in the growth of the fetus in the uterus as well as the local endocrine factors which affect the relation between the uterus and its contents. We have noted the orderly change of the shape of the uterus during the several stages of uterine accommodation, and we have seen how at times this aids, and at other times hinders, uterine circulation. The fetus is called upon to face and survive, if possible, extreme physiological uterine ischemia. Fetal maturity at birth is likewise related to the mechanism of uterine accommodation. Finally, we have noted that as the last phase of uterine accommodation becomes established, the contents of the uterus outgrow the confines of an increasingly unfavorable uterine environment. Parturiation or fetal death is the inevitable climax of this related series of events.

In this effort on my part to make simple a complicated group of processes, it might appear to some that the final answer as to what controls the span of gestation and the final onset of labor is now known in its essential details. There is much more to learn, however, and I am certain that scholars and students with knowledge of gestational processes in a wide variety of species would have much of vital importance to add to what has been said. We need to know what governs the all important rise and fall of critical hormone production and effectiveness, and we should like to learn how it is that the uterus knows so well the theory of organized patterns of uterine accommodation and contractility. But to be curious and open minded about these and untold other problems of development is our primary concern. Just to the extent that you govern your thoughts and actions by persistent and objective inquiry will you merit your role as leaders in the field of veterinary medicine today.

Inactivated Vaccines in the Prophylaxis of Hog Cholera

A. H. QUIN, D.V.M.
Kansas City, Missouri

Is there a place for non-viable hog cholera vaccines in short and long range plans for the control and "practical eradication" of hog cholera?

Some 20 years ago, Dorset announced an effective vaccine of blood or blood and spleen origin inactivated with methyl rosaniline (crystal violet dye).

The new product received a cool reception from a majority of veterinary practitioners and serum-virus producers who did not wish to "rock the economic boat" of established virulent virus and antiserum usage.

There is little argument that crystal violet vaccine, properly produced, is a good immunizing antigen. The writer has repeatedly seen test pigs vaccinated with as little as 3 cc. of crystal violet vaccine successfully withstand a 2 cc. challenge of virulent virus 21 days later. In several score live pig tests under federal supervision over a period of years, the crystal violet vaccinees consistently withstood virus challenge while the unvaccinated controls sickened with hog cholera.

About the time that crystal violet vaccine usage had mounted to several million field doses annually, lapinized, modified, viable hog cholera virus came on to the scene with much attendant publicity. The modified viable vaccines were rightfully claimed to have two distinct advantages over inactivated vaccine: (1) They confer protection quickly (one week in contrast to two or three weeks), and (2) longer duration of protection (two years or more against one year for inactivated vaccine).

On premises or known areas where risk of cholera infection is indigenous and constant, the routine use of viable modified virus with conjoint antiserum is logically the protection procedure of choice.

In areas where hog cholera incidence is sporadic, and there are many such areas in the United States, usage of potent crystal violet hog cholera vaccine merits serious consideration. In such areas, withholding vaccination for ten days to two weeks after weaning carries little hazard of natural field exposure, and the cost of revaccinating breeding stock annually is not at all prohibitive.

Experience Elsewhere

For the past 15 years, many million head of swine in Brazil, a country where hog cholera is both common and virulent, have been successfully vaccinated with crystal violet vaccine by an intradermal injection in the skin of the external ear.

In the United Kingdom, almost two decades of crystal violet vaccine usage has demonstrated a protection value fully comparable to that of any other prophylactic method.

In Germany (*Jour. Am. Vet. Med. Assn.*, Mar. 1, 1958), it was noted: "The large area vaccination program apparently resulted in elimination of the virus from the area." Here, pigs were vaccinated with crystal violet vaccine at eight weeks of age, repeated in 14 days.

In Russia (*Jour. Am. Vet. Med. Assn.*, Mar. 1, 1958), it was reported that "since 1946, crystal violet vaccines have been widely used. They are prepared from native, American and, recently, from Chinese strains of virus. The Chinese strain has great virulence and good immunogenic qualities."

In Alabama, a sustained hog cholera control plan under supervision of state veterinarian, Dr. John Milligan, was conducted in the four leading swine raising counties of the state. Virulent virus usage was banned by law. Widespread vaccination of pigs and annual revaccination of breed-

ing stock with crystal violet vaccine was instituted. After the first year, cholera incidence almost disappeared.

Currently, the great majority of pigs reach slaughter when six to seven months of age. With creep-feeding, most pigs are weaned at four weeks of age. Hence, the one year span of crystal violet protection will cover most commercial pigs sent to slaughter. In the economics of cholera prophylaxis, a dose of crystal violet vaccine costs 30 cents. A dose of modified virus and 15 cc. of antiserum costs 44 cents. On a million head of field-vaccinated pigs, use of crystal violet vaccine would save veterinarians $140,000. over the cost of modified virus and serum.

We can summarize by stating that modified virus and antiserum is the method of choice in all areas where hog cholera risks are perennial and constant. Crystal violet vaccination may well be the method of choice in areas where cholera risks are sporadic but extensive enough to merit cost of protection.

IMMUNIZATION OF CATTLE AGAINST LEPTOSPIROSIS

Continued from page 408

Acknowledgement: *The authors wish to express their gratitude to Roy T. Hostettler, D.V.M., general practitioner, Goldendale, Wash., through whose interest and generous assistance these studies were facilitated.*

The funds used for construction of the facilities employed in these studies and for the original purchases of an experimental herd were provided by a special grant from the Governor's reserve funds.

This investigation was supported in part by (1) research grants E707 and E707-C from the National Institute of Allergy and Infectious Diseases of the National Institutes of Health, Public Health Service, (2) funds provided for biological and medical research by the State of Washington, Initiative Measure No. 171 and by grants from (3) the Veterinary Clinical Research Division, American Cyanamid Company, Pearl River, N. Y. and (4) Pitman-Moore Company, Indianapolis, Ind.

REFERENCES

1. York, C. J., and Baker, J. A., Vaccination for Bovine Leptospirosis. *Am. Jour. Vet. Res.*, 14:5, 1953.
2. York, C. J., and Brueckner, A. H., A Method for Control of Bovine Leptospirosis. Proc. U. S. Livestock Sanit. Assoc., 57:176, 1954.
3. Brown, A. L., Jensen, J. H., Creamer, A. A., and Scheidy, S. F., Evaluation of Leptospira Bacterin Prepared in Culture Medium. *Vet. Med.*, 50:349, 1955.
4. Gillespie, R. W. H., Ringen, L. M., Kenzy, S. G., and Bracken, F. K., Leptospirosis Research Progress Report. Wash. State Col., Dept. Anim. Husb., Stockmen's Handb., 154, 1955.
5. Burnstein, T., Scheidy, S. F., Bramel, R. G. and Jensen, J. H., Further Studies with *Leptospira pomona* Bacterin. Proc. U. S. Livestock Sanitary Assn., 139, 1956.
6. Hoag, W. G., and Bell, W. B., An Immunogenic Agent for the Protection of Cattle against *Leptospira pomona*. *Am. Jour. Vet. Res.*, 16:381, 1955.
7. Reinhard, K. R., and Hadlow, W. J., Experimental Bovine Leptospirosis — Pathological, Hematological, Bacteriological, and Serological Studies. Proc. Am. Vet. Med. Assn., 91:203, 1955.
8. Gillespie, R. W. H., Kenzy, S. G., Ringen, L., and Bracken, F. K., Studies on Leptospirosis in Cattle — Outline of Progress. Wash. State Col., Dept. Anim. Husb., Stockmen's Handb., 76, 1953.
9. Gillespie, R. W. H., Kenzy, S. G., Ringen, L. M. and Bracken, F. K., Studies on Bovine Leptospirosis. III. Isolation of *Leptospira pomona* from Surface Waters. *Am. Jour. Vet. Res.*, 18:76, 1957.
10. Unpublished data.

INFLUENCE OF CAROB FLOUR

Continued from page 420

single and divided therapeutic doses containing 37.5 gm. of phenothiazine N.F. and in small daily doses containing 1.0, 2.0, or 3.0 gm. of the N.F. product. The milk from all animals developed the characteristic pinkish discoloration that followed treatment with similar doses of phenothiazine alone. Moreover, the discoloration developed as promptly, attained equal intensity, and persisted for similar or longer periods at maximum and minimal detectable levels. Carob flour, therefore, does not appear to offer any promise of furthering the use of phenothiazine for dairy goats in production.

REFERENCES

1. Enzie, F. D., and Kurtpinar, H., The Effect of Therapeutic and Small Daily Doses of Phenothiazine on the Color of Goat Milk. *Vet. Med.*, 45:361, 1950.
2. Reddick, H. E., Jr., New Formula in Worming Cattle. *Calif. Vet.*, 8:19, 1955.

Editorial

CASUALTY and INCOME PROTECTION INSURANCE

AN INSURANCE PROGRAM, whether it be life, casualty, or income protection is an intensely personal matter. Next to personal freedoms, every expression of American law jealously guards the rights of individuals in contracts with underwriters, and accordingly restricts the operations of insurance companies. Insurance programs are designed only to assure that dependents are provided for in emergencies.

In 1945, the matter of classification of veterinarians with high risk groups for casualty insurance came to the attention of some leaders in the profession. These men took steps, including solicitation of the services of an informed insurance broker, with the objective of correcting an obvious wrong. It required three years of effort to reclassify veterinarians from extra-hazardous category to that of allied professional groups even then enjoying favorable rates for income protection and casualty insurance. Culmination of the effort was the acceptance by the Continental Casualty Company of Chicago, pioneer underwriters of this type of insurance, of veterinarians under a plan that has produced a nation-wide cooperative experience rating basis; providing world-wide coverage and national security.

The original plan, designated Silent Partner Insurance Program, attracted the attention of state veterinary associations. Over half of these organized groups endorsed the plan and encouraged their membership to participate. The policies were filed for approval with the State Department of Insurance and a State Association Insurance Committee was set up in each state to assure home rule of the state-operated plan. These committeemen were charged with full supervision of the program and now function virtually as agents for insured members in the state.

Filed Nation-Wide

The more recently revised (1956) Silent Partner D. V. M. "Loss of Time" policy and the Silent Partner Family Major Hospital policy, combined to make the Silent Partner "Living Security" plan, are filed in all but two states of the nation. This is a further result of the pioneer experience gained under the original policies. Coverage can not be terminated by the underwriters in any particular state. *Nor can an individual's policy be cancelled — in spite of statements to the contrary by some unscruplous persons* — unless all like Silent Partner Policies are cancelled and the program terminated on a nation-wide basis. Payment of premium as stated on the policy entitles a veterinarian to remain a member-policy holder until either retirement or age 70 is reached. These statements have been substantiated by persons of authority at the home office of the Continental Casualty Company.

Also, in spite of rumors and statements made to the contrary, no restrictive riders

or limitations may be imposed on any member by the Continental Casualty Company after a policy is in force, *nor can his premium be adjusted upward.* Legislative action has imposed these and other restrictions on insurance contracts (policies).

The Silent Partner cost is considerably less than any comparable individual coverage because of geographical spread of risk. When a veterinarian enrolls in the Silent Partner Program, he is alligning his personal insurance program under the guidance of sound local (state) service and the handling of his insurance welfare by colleagues of his acquaintance. Readers are again encouraged to inform themselves of advantageous features of various income protection and casualty insurance available to them and compare rates for specified benefits.

Symposium on Regulatory Veterinary Medicine

The annual work conference for state and federal regulatory veterinarians held each year during the American Veterinary Medical Association convention is scheduled this year to be a symposium on regulatory veterinary medicine, it was announced by Dr. Ralph A. Hendershott, secretary of the United States Livestock Sanitary Association. The symposium will be held in the Front Lobby, Convention Hall, of the Philadelphia Convention Auditorium on the afternoon of August 19 and the morning of August 20. The symposium is under the cosponsorship of the U. S. Livestock Sanitary Association and the Argricultural Research Service in cooperation with the A.V.M.A.

Dr. B. T. Shaw

Symposium Program Highlights

Highlights of the program will be addresses by Dr. B. T. Shaw, administrator of the Agricultural Research Service, on animal health and American agriculture; and Mr. Albert K. Mitchell, prominent New Mexico cattleman, on animal disease eradication and its benefits to the producer. On the morning of the 20th, a discussion of the role of regulatory veterinary medicine in the atomic age will be of particular interest, especially the discussion of peacetime uses of irradication as illustrated by the screwworm eradication program now being carried on in the southeast, and plans for the use of irradiation in the preservation of food. Dr. Robert S. Sharman, veterinarian in charge of the USDA phase of the program, will discuss the role of regulatory veterinary medicine in the atomic age.

Proceedings

The proceedings of the symposium, which are expected to be available shortly after the convention, will be distributed to state and federal regulatory agencies, schools and colleges of veterinary medicine, and a limited number will be available for distribution to other persons. It is intended that the proceedings will provide a long-needed outline for the conduct of regulatory veterinary medical programs. The discussion of how these programs are administered should be of inestimable value to veterinarians engaged in regulatory work, to veterinary students and to practitioners who assume regulatory responsibilities as part of their practice.

Dr. Nelson S. Mayo
1866-1958

Dr. Nelson S. Mayo

Death came to Dr. Nelson S. Mayo at his home in Chicago on July 5, 1958, at age 92 years.

Doctor Mayo was well known among his comtemporaries for more than 50 years of active professional life. He retired in 1935 and since enjoyed the plaudits of a grateful profession for contributions in many fields, some of which are not well-known to the younger men. He was awarded the International Veterinary Congress Prize in 1950.

Doctor Mayo was born on a Michigan farm in 1866 and graduated from the Michigan Agricultural College (now Michigan State University) earning the degrees of B.S and M.S. in agriculture. He was graduated from the Chicago Veterinary College in 1889. His services of teacher include one year at Michigan State, ten years at Kansas State College, four years at the Connecticut Agriculture College and four years at the Virginia Polytechnic Institute. At Kansas he is recognized as the first professor of veterinary science and established the department since developed to the School of Veterinary Medicine. Other activities included a five year tour in the Republic of Cuba where he was vice director of the Agricultural Experiment Station and chief of the Bureau of Animal Industry, and 17 years with the Abbott Laboratories, first as head of the Veterinary Department and later in charge of the Export Department.

In veterinary associations, Doctor Mayo was long active in the states in which he lived. He served the A.V.M.A. as its secretary for six years (1913-15 and 1918-22) and chairman of its Education Committee for 12 years (1932-43). Though his contributions were significant as a practitioner, teacher, and research worker, his primary interest was closely interwoven with efforts to raise education standards of the profession. It was largely through his efforts and during his service period on the Education Committee that the most recent major advance was made — requirements for six years of college level training for qualification for degree in veterinary science.

Doctor Mayo was a prolific writer. He was author of a textbook, Diseases of Animals, and was a frequent contributor to veterinary and agricultural periodical over a long period. Readers are referred to a series of ten articles entitled Reminiscences beginning in VETERINARY MEDICINE over ten years ago (40:85 [Mar.], 1945 through 41:171 [May], 1946) perhaps the latest of his intensive writing. This series is a remarkably frank recounting of experiences of a veterinarian during the late 19th and early 20th centuries. Reading the entire series of Reminiscences is urged by all not only as an enjoyable experience but as a revealing history of developments on which modern veterinary science is based.

Administration of Anthelmintics

Effectiveness of anthelmintics in ruminants is dependent in many instances on placement of the agent directly into the abomasum. In order to effect this, animals must be starved for an overnight period, then given a large dose of sodium bicarbonate to close the oesophageal groove, followed by the anthelmintic. Without these preliminary steps efficacy of some remedies are greatly reduced.

DR. W. W. ARMISTEAD

President

Philadelphia as host city to the A.V.M.A. convention (August 18-21, 1958) has been the subject of considerable publicity. Pointed out also have been vacation features of a visit to the nation's birthplace and third largest city. Presiding at Philadelphia will be Dr. W. W. Armistead, Dean of the College of Veterinary Medicine, Michigan State University, East Lansing, and President of the A.V.M.A.

PHILADELPHIA CONVENTION INVITATION

In the current issue of the Journal *(Jour. Am. Vet. Med. Assn.,* 133:11 [July 1], 1958) the complete program is detailed including reporters and subjects for all sessions. Even a cursory glance suggests the scope of this important conference and reflects much credit on those responsible for selection of subjects and authorities to present them.

Although President W. W. Armistead will not declare the official opening until Monday August 18, ten group conferences and meetings will convene on the preceeding Sunday in the afternoon and evening. Other groups will meet in evening sesion during the week. The importance of these has become evident as size of sectional meeting has increased. Actually these groups are further specialization of the six general fields that constitute section meetings. Each of these is vital to progress of the science.

Again this year, television will be made available through the generous support of the Allied Laboratories in cooperation with the Radio Corporation of America. Dr. L. E. Fisher, coordinator of the television programs since their initiation at Milwaukee in 1951, will emcee the scheduled sessions in four of the six sectional meetings. Doctor Fisher's talents have in no small way contributed to the popularity and educational value of these programs. He deserves a vote of thanks for finesse in television technics and clarity of presentations.

Although much thought and careful plans are made for the enjoyment of visitors to Philadelphia, as has been customary in the past, the value of this annual meeting is in the serious deliberations in special sections. Veterinary medicine has proved again and again that it is a vital, growing science that is keeping pace with technological advancement of the times. Participants in these assemblies derive personal advantages not available by any other means. Applications of lessons learned in scheduled discussions, study of scientific and commercial exhibits, and even from hallway conferences are certain to be enlightening and indirectly prove of value to animal owners all serve, either directly or indirectly.

Practitioner's Laboratory

W. L. SIPPEL, V.M.D., Ph.D.

Florida Livestock Board
Kissimmee, Florida

Methylene Blue Liver Function Test for Dogs

Tests for liver function are often helpful in arriving at a diagnosis. One difficulty with these tests is deciding which of the over 100 available should be used. For the purposes of most busy practitioners, the primary criteria will be reliability, simplicity of performance, ease of reading and interpretation.

Bilirubin is not ordinarily present in the urine and the methylene blue test is used to detect it. It occurs under conditions of impaired hepatocellular function or biliary obstruction, but not as a result of excessive blood destruction unless accompanied by liver cell damage. Boddie[1] concludes that in dogs, the methylene blue test can be used to differentiate between hemolytic and obstructive jaundice.

Technic

A simple procedure that has withstood the test of time for specimens from dogs is the methylene blue test. This test is performed as follows:

1. To 5 cc. of urine add 20 cc. of tap water. (The water is omitted in some descriptions of the test.)

2. Add, drop by drop, 0.2% (actual dye content) aqueous methylene blue solution with a pipette that delivers 20 drops per cubic centimeter.

3. Usually less than 5 drops are required to change the greenish color to blue. If over five drops are required it indicates an impaired liver function.

According to Lichtman,[2] only to a minor extent is there a chemical reaction between the bilirubin and methylene blue. It has been demonstrated spectrophotometrically that the reaction is primarily a physical blending of colors. This author quotes Giordana and others as indicating that in humans the test is positive when the urine contains a concentration of 2 or 3 mg. of bilirubin per 100 ml. Penicillin and riboflavin produce false positive methylene blue tests. The latter compound makes the test unreliable for herbivores as riboflavin is synthesized by microorganisms in their digestive tracts and eliminated in the urine. Lichtman[2] states, "In spite of the limitations of the procedure, it is a practical one if properly applied." Lichtman[2] quotes Myers as finding a positive urinary methylene blue test before a rise in serum bilirubin occurred.

A Routine Test

Dr. L. B. Sholl of Michigan State University indicates[3] that the test is used routinely in their laboratory and he feels it is of definite value. Doctor Sholl writes that in cases of infectious hepatitis of dogs, 20 drops or more of methylene blue solution are often required to produce a blue color.

Another simple test for urine bilirubin that is commercially available is the Ictotest (Ames Co., Inc., Elkhart, Ind.). This has the advantage of requiring only 5 drops of urine. It is performed as follows:

1. Five drops of urine are placed on a square of specially treated paper mat.

2. A tablet is supplied which is placed on the urine saturated paper mat.

3. Two drops of water are flowed over the tablet and onto the mat.

In positive tests, the mat turns bluish purple in 30 seconds, the amount of bilirubin being proportional to the speed and intensity of the color development. In negative tests, the mat is colorless or may appear pink or red.

Uses of Urine Bilirubin Tests

These tests will be useful in suspected cases of infectious hepatitis, poisoning by agents that damage the liver, such as tetrachlorethylene (over-enthusiastic wormings), phosphorus, carbon tetrachloride, chloroform, the arsenicals, and others. It is a good routine test prior to administering arsenical treatment for heartworms. As indicated above, it will help differentiate between hemolytic, toxic, and obstructive jaundice.

REFERENCES

1. Boddie, Geo. F., Diagnostic Methods in Veterinary Medicine. 4th ed., 1956. J. B. Lippincott Co., Philadelphia.

2. Lichtman, S. S., Diseases of the Liver, Gall Bladder and Bile Ducts. Lea and Febiger, Phila. 1953, Vol. 1, p. 295.

3. Personal communication.

LUNGWORM TREATMENT FOR SWINE

Continued from page 415

It was not considered necessary to give an antidote.

5. Cyanacethydrazide (Dictycide) is considered as being specific for lungworms. It has no obvious effect on other parasites of swine.

6. Greatest benefits are usually observed in young pigs before extensive lung damage and secondary infections become established.

7. One injection in infected show animals or breeding stock will usually allay coughing and respiratory embarrassment associated with lungworm infection.

8. In consideration of data so far accumulated, benefits of two weekly injections in infected feeder pigs appears to be an economically sound recommendation.

REFERENCE

1. Wallev, J. K., A New Drug, Cyanacethydrazide, for the Oral and Subcutaneous Treatment of Lungworm Disease in Animals. *Jour. Am. Vet. Med. Assn.*, 131:539, 1957.

The next project stressing interprofessional relations will be presented at the 1958 Ohio State Fair.

Ohio State V. M. A. Exhibit

The Ohio State Veterinary Medical Association exhibit displayed at the annual convention of the Ohio State Pharmaceutical Association, May 11-14, in Cincinnati was the third of its kind presented by the Cincinnati Veterinary Medical Association in their promotion of interprofessional relations within the healing arts professions.

The first exhibit was developed by the Cincinnati interprofessional group, and exhibited at the Health Fair in Cincinnati in 1957.

The second exhibit was developed by the Cincinnati Veterinary Medical Association in cooperation with Ohio State University and was also exhibited at the Health Fair. It has been estimated that approximately 500,000 viewed the displays.

Animal Health

R. R. DYKSTRA, D.V.M.

Bloat

Investigators are continuing attempts to determine methods of controlling bloat in cattle.

1. At the Michigan Agricultural Experiment Station, feeding of penicillin for the control of bloat in grazing cattle and its effect on milk production has brought out that "the incidence of pasture bloat was reduced by about two-thirds by feeding 100 mg. of procaine penicillin per cow per day either with the grain or in salt on a free-choice basis." The value of this method of prevention appears to decrease as the season advances, but as a whole this was helpful.

2. Investigation of mucin as a preventive of bloat has been pursued at the Kansas Agricultural Experiment Station. An earlier South African determination revealed that fluid rumen contents or at least that having high moisture, favors escape of forming gas to an area above the ingesta. Otherwise the physical nature of the mass tends to the formation of gas bubbles mixed throughout the ingesta. Addition of a mucin containing substance to the feed appeared to favor escape of gas from frothing rumen contents. Linseed meal is rich in mucin. In dry cattle 2 lb. of linseed meal daily in the feed reduced incidence of bloat. In lactating cows on alfalfa pasture fed 1 to 2 lb. of linseed meal per head in from two to four feedings prior to pasturing also reduced bloat incidence. Those animals that did bloat recovered more quickly than controls so that it was not necessary to remove some of the former group from the pasture. Research is continuing on this project in an effort to find a more economical source of mucin that may be incorporated in the feed.

3. Workers at the Iowa station report that feeding water-dispersible lard oil mixed in the grain at the rate of 0.5 lb. daily or added to the drinking water (2% by weight average daily consumption 0.65 lb.) reduced bloat severity. Soybean oil in the grain (0.5 lb. per day) or sprayed on alfalfa ensilage also reduced bloat. They also report that daily penicillin in the feed lost its efficiency after a nine-day trial.

Corneal Ulcers

A recent communication from a colleague suggests that a discussion of the treatment of corneal ulcers in both large and small animals would be opportune.

The anatomy of the eye and pathology of corneal ulcers, from the standpoint of handling, are similar in all mammals. Treatment in general depends on the stage of advancement of the disease process. Use of antibiotics, hydrocortisone and sulfonamide insufflation are always in order. Daily flushing with a normal saline solution assists in the removal of debris. If the condition is so far advanced that exuberant granulations are retarding healing, then light cauterization with an electric needle is giving good results in the hands of human practitioners. It is also used by some small animal practitioners.

Methylene Blue in Cyanide Poisoning

In a discussion of treatment of cyanide and nitrite poisoning, Clark (*The Auburn Vet.* Spring 1958) states that methylene blue is somewhat tricky due to the fact that small doses have just the opposite effect hemoglobin as compared to large doses.

He indicates that if used in the treatment of cyanide poisoning, care must be taken not to give too large doses as this would change excessive amount of hemoglobin to methemoglobin with resulting anoxia. One half gram for each 500 lb. weight is the recommended dosage so that only a comparatively small amount of methemoglobin is formed to combine with the cyanide. If the dose of methylene blue is excessive—(2 to 3 gm. for each 500 lb.) so much methemoglobin is formed that results are decidedly harmful.

Nutrition

MORRIS ERDHEIM, D.V.M.

Tranquilizers

This group of drugs was developed and used in human medicine amid a background of romance which stimulated widespread interest. The first of these was Rauwolfia which is grown in the Far East. The root of this plant, named for the 16th century German botanist, Leanhard Rauwolf, has been used in India for the treatment of a variety of conditions, including forms of insanity, snake-bite, and hypertension. With this origin in mystical India, tranquilizers were introduced onto the American scene by Hollywood actors and television personalities. "Happiness pills," "Milltown," and similar words became the key to the comedians' lines.

The active alkaloids in Rauwolfia were isolated and crystalized. They were given the name reserpine. In a short time, many other compounds were found to have tranquilizing properties. The following table from a paper by Doctor Beeson in the June issue of *Feed Age*, lists compounds now being used under five classifications:

1. Phenothiazine derivatives:
   Chlorpromazine
   Mepazine
   Perphenazine
   Proclorperazine
   Promazine
   Thiopropazate
2. Rauwolfia alkaloids:
   Reserpine
   Deserpidine
   Rescinnamine
3. Diphenylmethane derivatives:
   Azacyclonol
   Benactyzine
   Hydroxyzine
   Phenyltoloxamine
4. Substituted propanediols:
   Meprobamate
   Phenaglycodol
5. Miscellaneous:
   Etchlorvynol

Veterinary applications went beyond the mental anxiety cases suggested by human use. To be sure we have a number of indications in the "mental anxiety" category. Thus there is general use of tranquilizers today by both large animal and small animal practitioners. Following are some of the conditions for which tranquilizers appear to be indicated.

1. Allay viciousness in nervous animals.

2. Induce normal maternal instinct in nervous sows.

3. Relax nervous small animal patients to facilitate examination, medication, or grooming.

In addition, there are tranquilizing products on the market which are recommended for use in cases of stress. These products are said to lower losses during shipping. The calming effect of the drug may reduce the bruising and shrinking associated with shipment.

There is strong feeling, too, that tranquilizers may cut losses from shipping fever by helping animals to adapt to the stresses of shipment more easily. Another application in cattle is the reduction of the "dark cutter syndrome" (the dark colored meat which develops when cattle have been slaughtered after they have been excited and agitated). They may also be indicated as adjunctive therapy in the treatment of colic, tetanus, heat stroke, laminitis and shock as well as in obstetrics.

Of Interest to Nutritionists

So much for a brief review of the activity surrounding tranquilizers in veterinary practice. This wide application in veterinary medicine encouraged nutritionists to find practical applications in routine feeding programs. The basic aim, of course, is to help the animal convert feed into meat,

milk, and eggs. To achieve this goal, the tranquilizers, as feed additives must relax the animal but not sedate it to the point of depressing appetite. Studies were conducted in all classes of stock. The most that can be said for the results of the tests reported to date, is "interesting."

Poultry

The reports of work done on the feeding of tranquilizers to poultry indicate an interest in a wide possible application. Cornell workers reported at the 1957 Cornell Nutrition Conference that reserpine eliminated excessive fighting and cannibalism in pheasants. However, egg production and hatchability were reduced when fed to breeders. They used 2.5 mg. of reserpine per lb. of feed in this study.

Heat stress seems to be another area where tranquilizers may find application. Van Matre, Burger and Lorenz of the University of California reported at the 1957 Poultry Science meeting that 0.5 mg. of reserpine per kg. of feed reduced the drop in egg production and mortality of hens subjected to heat stress. Egg quality was also improved.

In chick growth tests at South Dakota, 2 mg. of reserpine per lb. of feed seemed to be too high in one test but not in others.

Cattle

The tranquilizers being fed to cattle on experiment are Rauwolfia — 25 mg. per head per day; hydroxyzine — 2.5 mg. per head per day, and reserpine — 60 micrograms per head per day. Sherman *et al.* (*Jour. An. Sci.*, 16:1020) reported improved growth and feed efficiency by feeding the three drugs mentioned above.

Beeson (Purdue Mimeo A.H. 229, 1958) could get no response from feeding the three tranquilizers mentioned above when stilbestrol was not included in the feeding program. When the steers were implanted with stilbestrol and fed antibiotics, the addition of tranquilizers caused improvement in daily gain and feed efficiency.

Lambs

Feeding reserpine and hydroxyzine did not improve feed efficiency and daily gains in lamb feeding trials conducted at Purdue and reported by Andrews (*Jour. An. Sci.*, 17:157). In this test, .25 mg. of reserpine per lb. of feed had no effect while double that level appeared to depress growth.

Iowa State College work showed some advantage when hydroxyzine was fed to lambs; 17% increased gains over the controls on 6.5% less feed.

Swine

While work is going on in this field, no final reports have been published as yet on the effect of tranquilizers fed to swine on growth rate and feed efficiency. Preliminary observations of Beeson's work at Purdue suggest that if pigs will respond to tranquilizers the levels needed will be small. As little as .15 mg. of reserpine per lb. of feed caused scouring in pigs. This lowered weight gains.

While all of these studies are of interest to those involved in livestock production, it is too early to say that tranquilizers will find their way into the feed as additives. Veterinary practitioners should follow this development closely. If we do start feeding tranquilizers, we might have to differentiate between a lethargic attitude associated with disease and that caused by an overdose of "happiness powder" in the feed.

A.A.V.N. Meeting

The American Association of Veterinary Nutritionists will meet during the A.V.M.A. convention in Philadelphia. The meeting will be held 7 p.m. Monday, August 18, in the Constitution Room of the Sheraton.

The program will inclued two papers on nutrition. Veterinarians interested in this general field are invited to attend. A business meeting will follow this portion of the meeting. All members of the A.A.V.N. are urged to participate.

Distaff

MRS. E. F. (HAZEL) EBERT

Convention - Vacation

Everywhere in America there is something colorful to see. Geysers, hot springs, canyons and limitless lands are among the points of interest that mark the West; and in the East, man-made canyons of granite and brick punctuate a territory full of waterfalls, forests and all the rest from rock bound Maine to the Florida Keys, with Philadelphia thrown in for good measure. The A.V.M.A. convention is in Philadelphia this year, and that is what I would like to visit with you about.

Plan a Vacation

One of the subjects I always try to stress with wives of students is that wise planning underscores the success of a vacation. It is almost as easy to squander free time as it is to squander working time. A plan of operation can prevent both.

I do not know whether it is true or not, but I have been told that August is not the busiest month of the year for most veterinarians. If this is true, it seems to me that it can hardly apply to the distaff side of the family. I have no statistical basis for saying so, but I still like to think that most wives use August as canning time and freezing time, with jelly and preserve making and getting the children's clothes ready for school as necessary sidelines. And this to me adds up to a busy month.

But at the same time, August is the traditional vacation month. With the convention in Philadelphia standing on ground already occupied by traditional vacation time, it may well be that the professional trip can include a side departure into time-off activities. All that is needed is a plan.

A plan need not be elaborate. It should, however, preclude unpleasant situations, such as not finding a place to sleep, and it should outline enough activities to make the vacation period crackle with excitement of the relaxing kind.

Informal Rest and Relaxation

One of the simplest plans that my husband and I have ever come across unfolded one day while we were driving leasurely through Maine. We had been enjoying the serene, peaceful country when my husband decided to stop at some veterinarian's home or office to visit for a few minutes. It was only a matter of minutes before we noticed a practitioner's shingle and pulled into the front yard.

A charming young woman answered the door. We introduced ourselves, and in minutes the aroma of coffee filled the living room of their home. We enjoyed the visit with them and learned more about Maine than we could have gotten in many hours of reading. We still hear from them at Christmas time.

A.V.M.A. meetings are held in different sections of the United States each year. We have found that by attending these meetings we have been able to see much of interest and visit with friends who are striving for the same goals. By planning our vacations around the A.V.M.A. meeting and taking in a few impromptu visits along the way, we have arrived at our own informal plan for rest and relaxation.

Philadelphia

Incidently, visitors to Philadelphia will be interested to learn that plans are now in process for expansion of Independence National Historical Park to include facilities to accommodate the more than a million visitors that annually view the historical landmarks. An interpretive program is now underway, and visitors to the convention city will be able to trace the steps from reconstructed City Tavern, where the story of Independence began, to Independence Hall, where the die was cast.

Thus convention visitors can recall the stirring days of our national beginnings.

Classified Advertisements

Twenty-five words or less, $3.50—minimum charge; additional words 10 cents each. Replies sent care VETERINARY MEDICINE. 50 cents additional to cover forwarding postage. Remittance must accompany order.

Names of classified advertisers using V. M. key numbers can not be supplied. Address your inquiry to key number care VETERINARY MEDICINE, Suite 803, Livestock Exchange Building, Kansas City 2, Missouri, and it will be promptly forwarded to the advertiser.

Deadline for copy — 5th of month preceding date on issue.

For Sale

ESTABLISHED PRACTICE: For sale in north central New England. A prosperous general practice. Accent on dairy cattle, with sufficient light horse and pet work to make fine combination. Sale price $37,000, includes valuable real estate and equipment. Address Box 520, care VETERINARY MEDICINE.

ANIMAL HOSPITAL: For lease with option to buy — modern animal hospital. Superbly equipped for interesting and profitable mixed practice. Only capable man with Connecticut license considered for this outstanding opportunity. Address Box 522, care VETERINARY MEDICINE.

ANIMAL HOSPITAL: Sacrificing for quick sale, well established, fully equipped animal hospital. Includes landscaped Colonial home. $15,000, needed to handle. Address Box 523, care VETERINARY MEDICINE.

SMALL ANIMAL HOSPITAL: A nice small animal hospital, complete with equipment, drugs, instruments, kennels, furniture; large animal equipment and drugs; in mixed practice in New York state. Total price $10,000, with $4,000, down for quick sale. Four bedroom new house available on lease option or for sale if desired. Hospital real estate alone worth more than price; complete with table, kennels, cases, drugs, autoclave, 2-way radios, instruments, furniture, etc. Will help new man for short while for fast action now. Other interests. Wire or write Box 527, care VETERINARY MEDICINE.

CLASSIC WORK ON CANINE GENETICS: Judy's Dog Breeding Theory & Practice, new edition—$5. Dog World (monthly magazine)—$3. per year; address 3323 Michigan Blvd., Chicago 16, Ill.

Wanted

GENERAL PRACTITIONER: Capable of taking complete charge of thriving mixed practice in Connecticut. $175. per week and living quarters for single man. Option to purchase within a year to qualified man. Address box 521, care VETERINARY MEDICINE.

VETERINARIAN: Wanted to assist in dairy practice. Located in New York state. Address Box 519, care VETERINARY MEDICINE.

VETERINARIAN: Large pharmaceutical house in Midwest needs young veterinarian (25-35) in its research program. His principal functions would be clinical evaluation of drugs and services as research farm veterinarian. Entire time might eventually be devoted to either activity. Prefer man with 3-4 years pre-veterinary medical education, with veterinary medical degree, and about 2 years experience in general practice. Address Box 525, care VETERINARY MEDICINE.

M·A·C

Quick relief for Bone, Bursal or Tendon Lameness

Single Bottle.....$2.00
3 and 1 free.....5.00
6 and 2 free.....9.00
12 and 4 free.....17.00
24 and 4 free.....28.00

CARTER-LUFF CHEMICAL CO.
Hudson, N. Y.

Services

CLIPPER BLADES SHARPENED: Polished, guaranteed equal to new — 75c per set. Complete repair service for Oster clippers. Southern Clipper Service, P. O. Box 1842, High Point, N. C.

VETERINARIAN: Graduate (OSU '56) with experience, desires position as assistant leading to permanent arrangement or partnership in small animal hospital. Married with military obligation completed. Best of references. Available immediately. Reply to Dr. W. Harold Davis, 18 Chestnut St., Naugatuck, Conn.

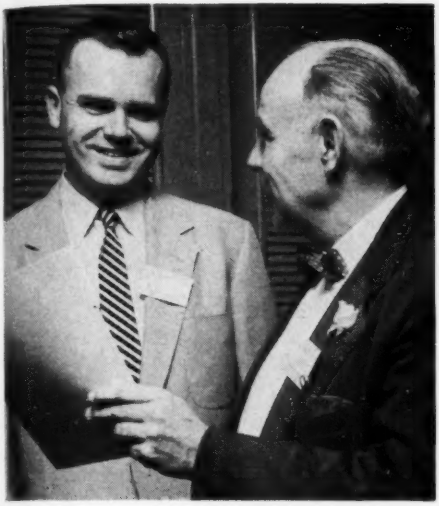
VETERINARIAN: With seven years general practice experience interested in association leading to partnership or purchase of general practice in southern or central Minnesota. Luthern, married, children. Address Box 524, care VETERINARY MEDICINE.

GRADUATE 1955: Being discharged from service in October. Desires position with small animal practitioner. Eighteen months small animal experience prior to service. Address Box 526 care VETERINARY MEDICINE.

When a high protein grain mixture is used to supply the minimum of TDN intake, ground corn cobs may be substituted for hay without seriously affecting milk production, according to Lassiter, *et al., Jour. Dairy Sci.*, 41:176 (Jan.) 1958.

Honor Doctor Hines

Dr. Martin P. Hines, public health veterinarian with the North Carolina State Board of Health, received the Reynolds Award on May 30 at the meeting of the North Carolina Public Health Association.



Dr. Martin P. Hines, (l.) receives the Reynolds Award from Dr. E. G. McGavran, dean, School of Public Health, University of North Carolina.

He is the first veterinarian to receive this award. A bronze engraved plaque was presented along with the following citation:

"For outstanding contributions to public health in North Carolina in the past years, the North Carolina Public Health Association has established the Carl V. Reynolds Award. The Association confers this award upon Dr. Martin P. Hines for this year of 1958."

RESEARCH VETERINARIAN

Challenging position open in our Biological Research Department for young veterinarian with experience or training in microbiological research. Rapidly expanding Biological and Pharmaceutical house located in Midwest. Ideal working conditions with liberal employee benefits including a profit sharing program. Please send complete resume' in first letter including approximate salary requirement. All replies held confidential. Our employees know of this ad. Address Box 518, care VETERINARY MEDICINE.

COLWELL

DAILY LOG

RECORD SUPPLIES FOR VETERINARY PHYSICIANS

FREE CATALOG

A complete line of Record Supplies and Professional Stationery designed specifically for the medical profession.

- Financial Record Book
- Appointment Book
- Printed Stationery
- Patients' Records
- File Guides
- Payment Records

NEW 1959 EDITION

THE COLWELL COMPANY
283 University Ave., Champaign, Ill.

TOTAMIN

T. M. Reg.

- Amino Acids
- Minerals and Vitamins

SOLD THROUGH THE VETERINARIAN

Write for an illustrated folder today or ask your distributor.

NUTRITIONAL MINERALS
Box 505, 404 E. 12th St.
Sioux Falls, S. Dak.

Smooth and Easy

You'll do better with Oster®

the Veterinarian's Clipper

Animals are more docile and easy to handle when clipped with the smoother, quieter Oster. And there is a blade size for every need . . . general, plucking length clipping and surgical shaving.

JOHN OSTER MANUFACTURING CO.
OU-58-9
Milwaukee 17, Wisconsin, U.S.A.

This department will announce each issue new therapeutic items, equipment, services, and literature of interest to veterinarians. All claims made are those of the firms concerned. Send communications to the address noted.

Reader's Service

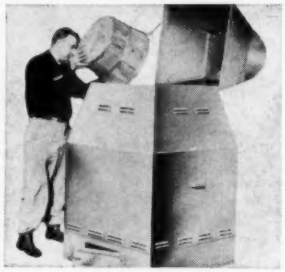
A feed grade **Enzyme Mixture** will soon be made available through Merck & Company under the tradename Gro Zyme. Field trials indicate that additions of as little as 1 lb. per ton of feed improve nutritional value of barley to approximately that of corn. For more information, ask Merck & Co., Rahway, N. J.

No. 8 M P **Surgical Light** designates a light designed for office, clinic and industrial examining room use, and is the first light in its price range to have multi-beam depth of focus. Concentric-cone light configuration minimizes fatigue-producing glare and shadow (even the presence of the veterinarian's hands between the lamp and operating field produce no shadow). Further information can be obtained from Wilmot Castle Co., 1919 East Henrietta Road, Rochester, N. Y.

Canine Bacterial and Nonspecific Diarrhea can be successfully treated with Furadex T.M. Tablets Veterinary, according to manufacturer's claims. It has also been used as an aid in controlling diarrhea associated with other diseases such as distemper and hepatitis. For details write Eaton Laboratories, Norwich, N. Y.

An unbreakable Graduate made of clear, glass-like plastic is now available to the profession. Manufacturer claims it will not craze or cloud and liquids will not permeate it. For available sizes and prices, ask Manufacturer name, Division 169, 255 W. Euclid Ave., Jackson, Mich.

A new, low-cost, portable **Outdoor Incinerator** requiring no auxiliary fuel or smoke stack facilities to burn 20 bushels at a loading is now being marketed by Alsto Company. It is designed for industrial, commercial and institutional use for burning damp, green or dry refuse in all kinds of weather. For a free catalog ask Alsto Co., 4007 Detroit Ave., Cleveland 13, Ohio.



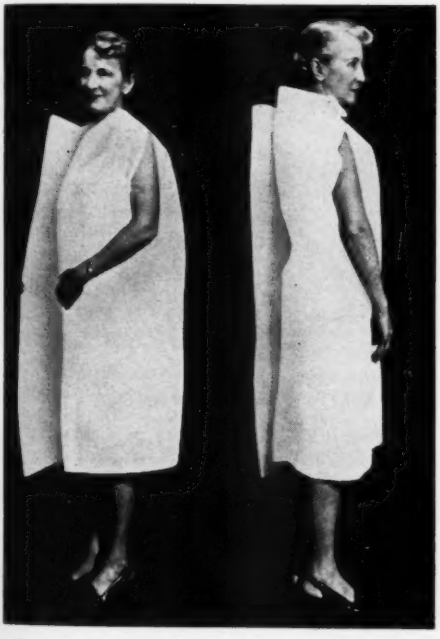
Alsto Company

Telephone Personality is a little booklet that spells out the rules of good telephone manners, and can be recommended to anyone who answers a doctor's telephone. For a free copy ask your local Bell Telephone Business Office.

Inhalation Anesthesia Procedure Notes for Veterinary Medicine is the title of a six-page bulletin that describes three anesthetic technics. A section is devoted to anesthesia for open chest surgery on small animals with accompanying photographs of a thoracotomy. For a free copy write Ohio Chemical & Surgical Equipment Co., 1400 East Washington Ave., Madison 10, Wisc.

A new Space-saving **Cylinder Cart** representing a major improvement over baggage-truck types is now available to solve inhalation therapy problems. The new unit has no handle or long vertical members. It consists of a two semi-pneumatic tires and two 360-degree swivel casters mounted on a welded base plate formed to fit around the lower part of the cylinder body. Check with National Cylinder Gas, 840 North Michigan Ave., Chicago 11, Ill.

Kemal livestock spray & dip combining the newly approved material malathion with the long standby, residual control material toxaphene for control of lice, hornflies, ticks and mange on beef cattle, sheep and goats, has just been approved under the Federal Insecticide, Fungicide and Rodenticide Act. The product is available throughout the United States. Detailed information is available through Vet-Kem Laboratories, 10219 Denton Drive, Dallas, Texas.



A new full length disposable paper examination gown has been introduced to the medical profession by Busse Hospital Products of New York. Made of heavy soft creped paper that is fully opaque and pleasant to the skin, this gown fills a long-standing demand for a disposable examination gown. Samples are available from the manufacturer at 64 East 8th Street, New York 3, N. Y.

An EDGE on them all

Cutting efficiency and maximum blade performance has always been the surgeon's first consideration when choosing a surgical blade. BARD-PARKER offers you a blade made with the same consideration in mind . . . a blade of carbon steel of course . . . so superior for fine cutting edges.

B-P RIB-BACK Blades are now available...

in the Puncture Proof Sterile Blade package that can be autoclaved.

in the CONVENTIONAL package — six of one size in a rustproof wrapper.

Ask your dealer

It's Sharp

B-P BARD-PARKER COMPANY, INC.
DANBURY, CONNECTICUT
A DIVISION OF BECTON, DICKINSON AND COMPANY

B-P • RIB-BACK • IT'S SHARP • RACK-PACK are trademarks of BARD-PARKER

SAMCO
Gas Fired

CREMATORY DESTRUCTOR

Engineered special for the Veterinary Practitioner

ANIMAL CARCASS CREMATION

RAPID DISPOSAL
Wet and dry sage papers, amputations, feces, entrails, garbage.

CLEAN AND ORDERLY PREMISES

CAPACITY 8 BU.
FEED DOOR 21" x 19"

100% SAFETY AUTOMATIC main burner with pilot light and timer shut off

Great heat and firepower

Larger Sizes Available

MANY IN USE

Investigate unique purchase plan for great saving.

SYRALL MANUFACTURING COMPANY
511 North State Street Syracuse 3, N. Y.

Client's Complaints

Dr. Harris H. Groten states (*N.Y.C. Vet.*, June 1958) that the majority of complaints of clients of veterinary practitioners have to do with alleged overcharge for services.

A more serious complaint, he adds, is that of leaving the hospital unattended. Practitioners who leave their establishments with hospitalized pets at any time without adequate coverage, while continuing hospital charges, may be subjecting themselves to possible charges of malpractice, negligence and unethical conduct.

Life Insurance for Cats

Life insurance for pedigreed cats is now available on an equal basis with pedigreed dogs, according to announcement from the Animal Insurance Company of America. Insurance is issued on an annual term mortality contract. Full details are available from the company, 92 Liberty Street, New York.

for Small and Large Animals

Metrazol

A quick-acting, powerful Antianesthetic and Respiratory — Circulatory Stimulant

Prevents and overcomes respiratory and circulatory inadequacy prior to or during surgery. Hastens post-operative recovery. Overcomes shallow respiration and sluggish circulation in old, toxic and debilitated animals when given orally.

Dose: Small animals ½ to 3 cc. METRAZOL by injection, as necessary.
One METRAZOL tablet orally three or four times a day.
Large animals 10 to 25 cc., intravenously, repeated as required.

Available in: Ampules, (100 mg. per cc.) 1 cc., 6's and 100's.
Sterile Vials (100 mg. per cc.) 30 cc. and 100 cc.
Oral Tablets, 0.1 Gm. (1½ grs.) each, 100's, 500's and 1000's.

Metrazol®, brand of pentylenetetrazol, E. Bilhuber, Inc.

KNOLL PHARMACEUTICAL COMPANY ORANGE NEW JERSEY

Stop "Abortion Storms" due to leptospirosis with

ANTILEPTO®

(Leptospira pomona bacterin)

Prevents and controls "lepto" in cattle, swine, horses and sheep

- **high protective titers in 7 days**
- **resistance to "lepto" in cattle for 12 to 14 months**
- **reduced incidence of abortion**
- **controlled spread of disease in infected herds**

MERCK & CO., INC.
CHEMICAL DIVISION
RAHWAY, NEW JERSEY

VETERINARY

MERCK

ANTILEPTO in bottles of 250 cc. (50 doses), 100 cc. (20 doses) and in vials of 25 cc. (5 doses).

Sold to veterinarians only

©MERCK & CO., INC.

OUTSTANDING!

wherever you find veterinarians!

See you at the AVMA National Convention!

Research Laboratories, Inc., Saint Joseph, Missouri

PARLAMATE®

(piperazine citrate, PARLAM)

Now available at the lowest prices in the field

'PARLAMATE' is a safe, new all species anthelmintic. Taste tested! Up to 100% effective against roundworms and nodular worms, in only one treatment. Highly acceptable. Pleasant tasting. Completely odorless.

For Dogs, Large Animal and Poultry Use:

#683, 'PARLAMATE' Citrate Liquid 30%. (Each fl. oz., approximately 30cc., contains 9 Gms. piperazine citrate, which is equivalent to 3.6 Gms. active anhydrous piperazine base.)

Gallon bottle	$9.60
Quart bottle	2.95
Pint bottle	1.65
8 fl. oz. bottle	.92
4 fl. oz. bottle	.54

#684, 'PARLAMATE' Citrate Tablets, 500 mg. (Each tablet contains the equivalent of 200 mg. available piperazine.)

Bottle of 1,000	$20.00
Bottle of 500	10.67
Bottle of 100	2.67

#680, 'PARLAMATE' Citrate Powder. (Contains 100% piperazine citrate.) In pre-weighed dispensing packages convenient for office and field use.

100 lb. bulk, per lb.	$4.73
50 lb. bulk, per lb.	4.80
25 lb. bulk, per lb.	4.87
10 lb. bulk, per lb.	4.93
5 lb. bulk, per lb.	4.97
16 oz. bottle	$5.00
8 oz. bottle	3.00
4 oz. bottle	1.67
1 oz. bottle	.50

For Puppies, Cats and other Small Animal Use:

#681, 'PARLAMATE' Citrate Tablets, 250 mg. (Each tablet contains the equivalent of 100 mg. available piperazine.)

Bottle of 1,000	$10.00
Bottle of 500	5.34
Bottle of 100	1.34

#682, 'PARLAMATE' Citrate Liquid 5%. (Each teaspoonful, approximately 5 cc., supplies 250 mg. piperazine citrate, which is equivalent to 100 mg. available piperazine.)

Gallon bottle	$8.00
Quart bottle	2.40
Pint bottle	1.34

Additional discounts as follows:
Orders totaling $100 or more.....less 5%
TERMS 1/10 NET 30, F.O.B. New York City
Freight allowed on orders of $25.00 or more.

You may order direct, or we can drop ship and bill you through your distributor.

Literature and samples on request.

TARGET POINT CHEMOTHERAPY

Parlam CORPORATION ● 266 S. Dean Street, Englewood, New Jersey

SOLE CANADIAN DISTRIBUTOR: Veterinary Medical Supply Co. of Canada, 6579 Somerled Ave., Montreal, Que.

"Pioneer in veterinary medicine for target point chemotherapy"

(Advertisement)

Research Reveals Highly Effective Anthelmintic for Cattle

The results of recently intensive clinical research revealed an anthelmintic that is highly effective in cattle. Individual animals were confined in special stalls and administered different phenothiazine drench formulations for testing. All urinary and fecal excreta were recovered and each excretion was individually analyzed chemically to determine how much of the dose went into the digestive tract and amount of the dose available for killing worms. Dosages were given on an identical basis.

GREATER CONCENTRATION

Results obtained from this modified formulation were better than that of unmodified drenches generally used. Tests show that modified formulations produced on the average 6 to 8 times more phenothiazine in the digestive tract in a shorter period of time than other drenches. For example, peak percentages (above 1%) of the modified chemical were obtained in only 17 hours post treatment while the average of unmodified formulations returned a peak percentage of less than .2% 40 hours or later post treatment.

All statements regarding the effectiveness of the above tests are backed by documented experimental data.

Many veterinarians are using this modified formula under the professional label Pro-Brand Improved Cattle Wormer which is sold only to veterinarians. A brochure is available on request. For details write to Pro-Brand Products Company, P. O. Box 4186, Fort Worth, Texas.

no side effects from THERAPOGEN

the proven effective germicidal agent

You'll find THERAPOGEN virtually free of side effects and toxicity. Its completely effective yet mild cleansing action has been found excellent for obstetrical work by veterinarians for many of the finest horse breeding farms in Kentucky. Inexpensive THERAPOGEN may be ideal for your needs, also.

Write, wire or call today for samples, literature and the name of your nearest distributor.

THEO. MEYER Est.

213 SO. 10TH ST., PHILA. 7, PA.

Doctor James H. Steele Honored

Dr. James H. Steele, chief veterinarian, Communicable Disease Center, United States Public Health Service, received the Alumni Award for Distinguished Service from Michigan State University at Commencement exercises June 8.

The award is made annually by the Michigan State University Alumni Club of Washington, D.C. in cooperation with the University. Doctor Steele was nominated by the Michigan State University Alumni Club of Atlanta. In addition to his position with the Communicable Disease Center, Doctor Steele is a department editor for VETERINARY MEDICINE. He is also the author of many articles on veterinary public health and has lectured at various universities, including Yale, Harvard, and Minnesota.

Doctor E. C. Jones Receives Award

Dr. E. C. Jones, president and chairman of the board of Norden Laboratories, Lincoln, was honored June 6 when Kansas State College presented him with the Distinguished Service Award in Veterinary Medicine. The award was made as a highlight of the annual banquet at the 20th Conference for Kansas Veterinarians at Manhattan. President James A. McCain (right) is shown making the award.

proven results in these diseases of small animals

CANINE TRACHEOBRONCHITIS (KENNEL COUGH). In one study of 12 cases, FURADANTIN stopped the cough completely within 3 to 7 days.[1]

URINARY TRACT INFECTIONS. Extensively used in human genitourinary tract infections, FURADANTIN has also produced impressive clinical results in the treatment of bacterial nephritis and cystitis of dogs and cats.[2]

• • •

Preliminary data point to new indications for FURADANTIN. Various reports describe encouraging results with FURADANTIN in the treatment of vaginitis in the bitch and genitourinary tract infections of mares.[2] Another article concludes that FURADANTIN is an excellent adjunct to surgery in the treatment of prostatic abscess in the dog.[3]

Like all the nitrofurans, FURADANTIN is bactericidal to a wide range of both gram-negative and gram-positive organisms. It is nontoxic to kidneys, liver and blood-forming organs; and development of bacterial resistance is negligible.

Available as orange scored tablets of 10, 50 and 100 mg.; and Oral Suspension, bottle of 60 cc.

REFERENCES: 1. Mosier, J. E.: Vet. M. 50:605 (Nov.) 1955. 2. Selloff, G. B.: Calif. Vet. 9:27 (Sept.-Oct.) 1956. 3. Pollock, S.: J. Am. Vet. M. Ass. 129:274 (Sept.) 1956.

FURADANTIN®
BRAND OF NITROFURANTOIN
veterinary

AVAILABLE THROUGH YOUR PROFESSIONAL VETERINARY DISTRIBUTOR

NITROFURANS—A NEW CLASS OF ANTIBACTERIALS

GET THE EXTRAS

offered by the NEW ADJUVANT

NEOJEL

PATENT PENDING

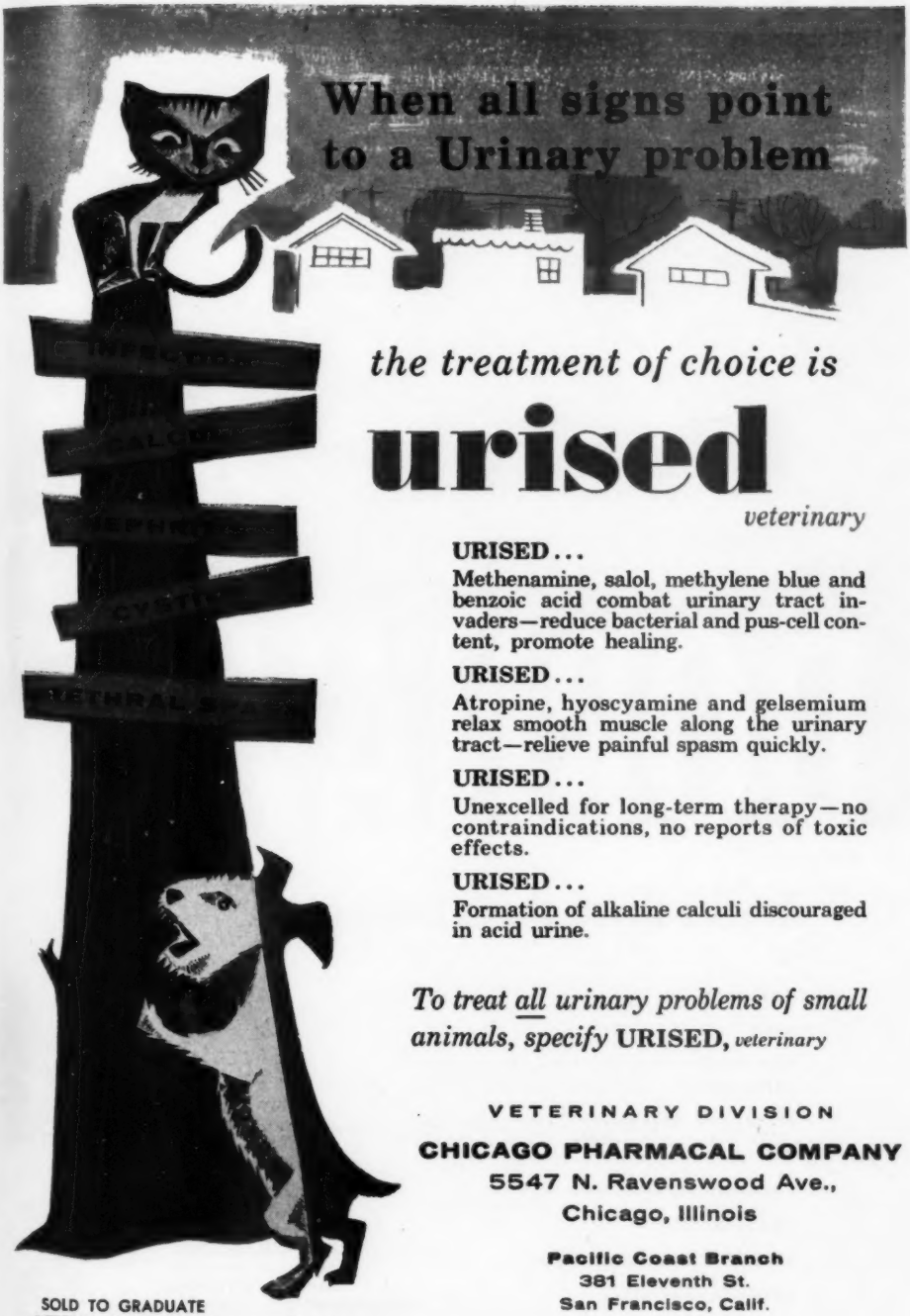
★ **Longer Immunity**
★ **Minimum Reactions**
★ **Smaller Dosage**

NEO-VAC ERYSIPELAS BACTERIN
and
LEPTOSPIRA POMONA BACTERIN

DIAMOND LABORATORIES

DES MOINES • IOWA

sales exclusively to veterinarians



the treatment of choice is

urised

veterinary

URISED...

Methenamine, salol, methylene blue and benzoic acid combat urinary tract invaders—reduce bacterial and pus-cell content, promote healing.

URISED...

Atropine, hyoscyamine and gelsemium relax smooth muscle along the urinary tract—relieve painful spasm quickly.

URISED...

Unexcelled for long-term therapy—no contraindications, no reports of toxic effects.

URISED...

Formation of alkaline calculi discouraged in acid urine.

To treat all urinary problems of small animals, specify **URISED,** *veterinary*

VETERINARY DIVISION

CHICAGO PHARMACAL COMPANY

5547 N. Ravenswood Ave.,
Chicago, Illinois

Pacific Coast Branch
381 Eleventh St.
San Francisco, Calif.

SOLD TO GRADUATE VETERINARIANS ONLY

Send for literature and clinical trial supply of **URISED,** *veterinary*

When recovery is held back by inflammation and debris...

DORNAVAC®

(PANCREATIC DORNASE)

breaks down the inflammatory barrier

IN

ABSCESSES

ALVEOLAR PERIOSTITIS

CHRONIC SUPPURATIVE NAVEL INFECTIONS

FISTULOUS WITHERS

MASTITIS

PULMONARY INFLAMMATION

PNEUMONIA

PURULENT EAR INFECTIONS

RHINOTRACHEITIS

SINUSITIS

WOUNDS

DORNAVAC

in cartons of 12 vials, each vial (10 cc.) containing 100,000 units of pancreatic dornase.

Sold to veterinarians only

MERCK & CO., INC.
CHEMICAL DIVISION
RAHWAY, NEW JERSEY

VETERINARY

MERCK

©MERCK & CO., INC.

Doctor Jungherr Receives A. H. I. Award

Dr. Erwin L. Jungherr, head of the Department of Animal Diseases of the University of Connecticut, and a world authority on poultry diseases, was presented the Distinguished Service Research Award by the Animal Health Institute, April 29. Doctor Jungherr was selected for his outstanding achievements in animal disease research which have contributed to the productive capacity of the multibillion dollar livestock and poultry industry.

The Award, which includes an engraved plaque and $1,000. cash, was made at a special luncheon at the 18th annual meeting of the Animal Health Institute in Washington.

Erysipelas in Baby Pigs

German research workers indicate that pigs born to erysipelas nonimmune sows were susceptible to swine erysipelas at birth and shortly thereafter, but that after obtaining colostrum rich in antibodies from immune sows, pigs developed passive resistance lasting several months. Resistance of these pigs was demonstrated by several serological tests.

MASON'S New KENNEL RUNS
NOW AVAILABLE
For SMALL ANIMAL HOSPITALS
Quickly Erected - NO POSTS REQUIRED
Can be set on concrete or wood floors or directly upon the ground, joining to, or independent of Building. Composed of strong, self-supporting Fence sections and Gate Units with GATES BUILT-IN and Lockable Latches.
FREE CATALOG
Send for Free Catalog with Low Direct Factory Prices of Kennel Fences of all kinds, Kennel Doors, Cages and Hospital Equipment.
THE MASON FENCE CO., Box 77, LEESBURG, OHIO

SHOR-LINE
ANIMAL CAGES

Two sizes available that can be arranged to meet your individual requirements and to fit most any floor plan. May be stacked in various combinations of height or width. Shipped assembled.

Doors galvanized after fabrication. Large Unit 36" wide, 30" high, 29" deep. Small Unit 24" wide, 30" high, 29" deep. Legs 8" high available on either unit. Available from leading Veterinary Distributors.

Write for descriptive bulletin and name of nearest distributor.

SCHROER MANUFACTURING CO., 2221 Campbell, Kansas City 8, Mo.

Manufacturers of complete line of veterinary tables—Animal cages—instruments and equipment

TELLING AMERICA
ABOUT THE
VETERINARY PROFESSION

TELEVISION TELLS OF VETERINARY

The powerful voice of television now joins with press and radio to bring America a still greater appreciation of modern veterinary service.

This project, sponsored by the member companies of Associated Veterinary Laboratories is beamed to TV viewers in 2 ways:

- Year 'round broadcasts on animal disease problems, furnished to over 140 TV stations, coast to coast.
- National TV showings of the veterinary film "Valiant Years" to an estimated 1958 audience of nearly 7,000,000.

Through this campaign in newspapers, farm magazines, radio, and television the public is learning the importance of always calling a veterinarian in matters of animal health, and the value of veterinary service to the community.

This program is made possible by the ethical companies listed on the opposite page. If you will keep them in mind in meeting your requirements it will be sincerely appreciated.

SERVICE

Associated Veterinary Laboratories

ASSOCIATED VETERINARY LABORATORIES
Sponsors of American Foundation for Animal Health

CORN BELT LABORATORIES, INC.
CORN STATES LABORATORIES, INC.
FORT DODGE LABORATORIES, INC.
GRAIN BELT SUPPLY CO.
THE GREGORY LABORATORY, INC.
JENSEN-SALSBERY LABORATORIES, INC.
LIBERTY LABORATORIES
THE NATIONAL LABORATORIES, CORP.
NORDEN LABORATORIES
PITMAN-MOORE CO.
SIOUX CITY SERUM CO.
SIOUX FALLS LABORATORIES, INC.
THE SOUTHWESTERN SERUM CO.
ALLIED LABORATORIES, INC.
BLUE CROSS SERUM CO.

Provide profit insurance . . .

Cuts weight losses in transport of feeder cattle

Tranquilization reduces response to various excitatory stimuli incidental to handling, loading and transportation of livestock. TRILAFON minimizes factors contributing to weight loss. **Savings may be estimated in terms of pounds—and dollars—per head.**

Relieves shipping fatigue and lowered resistance to infection

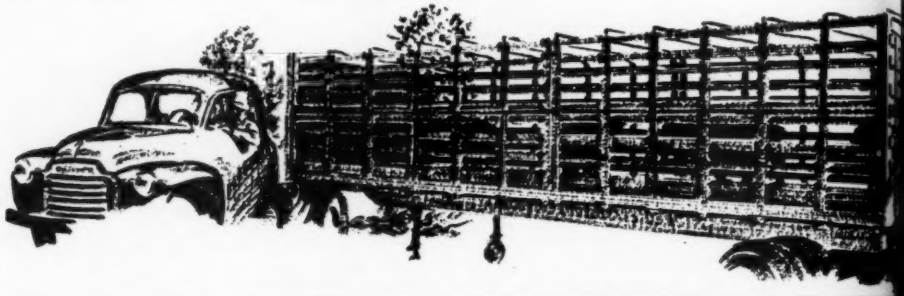
TRILAFON significantly reduces weight loss and incidence of respiratory disease (shipping fever) and diarrhea in animals subjected to traumatic shock during handling and shipment. Animals subjected to fright and deprivation of food and water normally suffer lowered resistance to infection.

Eases adaptation to new environments and management practices

TRILAFON facilitates transition from range or pasture to feedlot environment. Bawling, milling and fence walking are reduced; animals become more tractable and **go on full feed faster.** Stress induced by weaning, dehorning, castration, vaccination and other handling procedures is markedly lessened.

Reduces incidence and severity of infectious diseases aggravated by toxemia and environmental stress (when used as supportive therapy with appropriate chemotherapeutic agents)

TRILAFON shields animals against lowered resistance occurring in shock induced by various stress situations. As a potent adrenergic blocking agent it apparently antagonizes epinephrine release following frightening or traumatic stimuli. Thus the general lowering of resistance associated with such insults is **significantly reduced.**



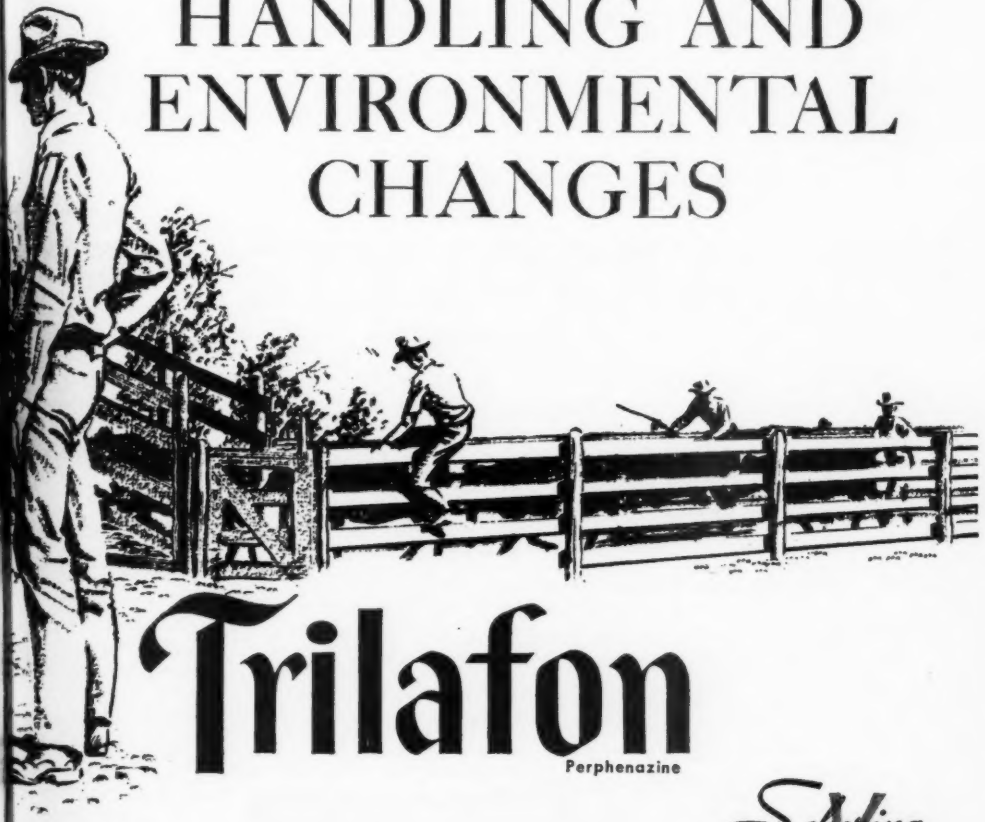
	Parenteral (intramuscular)	
Body Weight	Transportation	Adaptation
300-600 lbs.	25-50 mg.	15-25 mg.
600-900 lbs.	50-75 mg.	50 mg.
900 lbs. and over	75-100 mg.	50 mg.

In transportation and adaptation situations low dosages will produce the desired response without reduction of psychomotor activity. In these indications a clinically apparent degree of tranquilization is not required. Thus, **prescribed doses must be carefully observed.**

Packaging TRILAFON® Injection, 25 mg./cc., 30 cc. vial, boxes of 1 and 6; and 25 mg./cc., 100 cc. vial, boxes of 1, 6 and 36.

SCHERING CORPORATION • BLOOMFIELD, NEW JERSEY

SHIELD LIVESTOCK AGAINST WEIGHT LOSSES DUE TO TRANSPORT, HANDLING AND ENVIRONMENTAL CHANGES



Trilafon

Perphenazine

Schering

Many companies are trying to "imitate and duplicate but have failed to formulate!"

GENUINE

OCUROL-VET

The pinkeye medicine of choice among leading veterinarians around the world. Order from your favorite veterinary distributor.

THE OCUROL-VET COMPANY ★ SABINAL, TEXAS

SPECIAL

DAIRMOL DUSTING POWDER FOR GRANULAR VAGINITIS

Antiseptic **Astringent**

"THE DAIRMOL WAY"

Compounded under the direction of veterinarians of exceptional experience. Highly recommended by leading herdsmen as the best treatment for the purpose.

Also mfrs. of LIQUID Dairmol Antiseptic and Deodorant.

DALARE ASSOCIATES

23rd and Locust Sts. PHILADELPHIA 3, PA.

Whiteside Mastitis Test on Bulk Milk

A quick, reliable and simple test devised to detect the serious practice of mixing mastitic with normal milk would provide dairy plants and sanitarians with a basis for a program of controlling such practice.

Petersen and Schipper (*Jour. Dairy Sci.*, 36:595, 1953) examined the milk from 24 herds and found 19 of them exhibited strongly positive reaction to the Whiteside test performed on the herd supply. Only one of the 19 failed to show mastitis in the herd when checked by the strip cup.

Reporting in the *Journal of Milk and Food Technology* for January 1958, Jensen *et. al.*, suggest that wide use of the Whiteside test by bulk milk plants would make possible identification of herds where mastitis is troublesome. Having this information the problem could be referred for qualified professional service to reduce incidence, improve profit potential of dairymen and assure wholesome quality of milk and dairy products.

CURTS **ARSOLYTE** CURTS

(Powder)

Furnishing arsenic (as sodium arsanilate), electrolytes (potassium, calcium, sodium, and magnesium as chlorides) and trace elements (zinc, cobalt, manganese, copper, and iron in chemical combination) for administration in the drinking water for all livestock.

Especially for: Swine dysentery or enteritis
Diarrhea in calves and poultry
Alterative for cattle

Swine and Poultry: 10 oz. per 25 gallons drinking water
Cattle and Calves: 10 oz. per 100 to 300 gallons drinking water

Packed in sealed polyethylene packets (with tear-off and directions only label) for protection from atmospheric moisture.

Package: Carton of 1 doz. 10 oz. packets
25 lb. plastic lined fiber drum

order from your nearest CURTS distributor or direct

CURTS Laboratories, Inc.

Manufacturers of Veterinary Pharmaceuticals Since 1918

71 Central Avenue Kansas City 18, Kansas

First phosphate insecticide approved for direct application on cattle, hogs and poultry

Effectiveness plus low toxicity to animals supports malathion's new acceptance for control of external parasites

A significant advance was made in the control of insect pests on livestock with new, government residue tolerances for malathion insecticides. These tolerances cover meat and meat by-products from non-lactating cattle, hogs and poultry. Extensive research has proved the effectiveness—and safety to warm-blooded animals—of using this *phosphate* for direct application. The U.S. Public Health Service says in its *Clinical Memoranda on Economic Poisons,* "... the toxicities of malathion (oral and through the skin) are less than those of DDT."

Together with its long-established use for fly control in stock buildings, direct application of malathion now lets you recommend one insecticide for control of major poultry and livestock pests.

Resistant Insects Controlled

There are indications that insect resistance to the DDT family of insecticides is becoming a problem to livestock producers as it now is to crop farmers. At present, insects showing resistance include lice, flies and mosquitoes. Because malathion is a phosphate it has proved highly effective against these pests.

Residues

Malathion's thorough control and rapidly disappearing residues eliminate close-to-slaughter residue problems. Used according to directions, malathion can be applied directly to animals right up to slaughter. Malathion's tolerances are: 4 parts per million in or on meat and meat by-products; 0 parts per million in eggs.

Use Recommendations

Beef Cattle—Malathion sprays can be applied on cattle for control of lice, ticks and horn flies. In back-rubbing devices, malathion is effective against lice and horn flies. Malathion should *not* be used on lactating dairy animals or on calves under one month of age.

Here cattle are being sprayed for lice. Ticks and horn flies, when present, are also controlled.

Hogs—Use malathion on animals, pens and in litter for control of lice. One application usually does the job.

Poultry—Apply malathion sprays or dusts directly to birds to control Northern fowl mite and poultry lice. In poultry houses, spray malathion thoroughly on all surfaces to clean up Northern fowl mite, chicken red mite, poultry lice, ticks and flies. For mites and lice, dusts may also be used. Or apply malathion as a roost paint to control chicken red mite and poultry lice.

For rate information write for free leaflet.

Insect Control on Household Pets

Malathion sprays or dusts control fleas on dogs and cats. If animal is confined to a pest-free area, one treatment is usually sufficient. Malathion also controls ear mites on dogs.

▼ ▼ ▼

Malathion is *not* a brand name. It is the active ingredient in branded formulations offered by over 100 well-known manufacturers. American Cyanamid Company manufactures the basic ingredient. For a detailed leaflet describing direct application on livestock, or a supply to leave with your clients, write: American Cyanamid Company, Insecticide Dept. J1, N. Y. 20, N. Y.

FULLY GUARANTEED

TROPICAL

100% EFFECTIVE

TICK KILLER

AN OUNCE MAKES A QUART . . . JUST ADD WATER

Available in 4 oz. dispensor bottles and gallons

New formula, new pleasant odor. Maximum percentages MALATHION and ROTENONE. Guaranteed 100% effective against even resistant or immune species. Kills fleas in minutes; kills ticks including engorged females in a few hours. Excellent residual action. Non-irritating. Needs no after wash. Use as sponge-on lotion or dip.

ACTIVE INGREDIENTS: METHYLATED NAPHTHALENES (non-irritating neutral solvents), POLYOXYETHYLENE GROUP (emulsifiers and wetting agents), maximum percentages MALATHION and ROTENONE.

YOUR OWN PRIVATE LABEL AT NO EXTRA CHARGE is available on all Florida Veterinary Laboratories Co. products.

FLEA POWDER FOR DOGS • FLEA POWDER FOR CATS • TICK SALVE • FOAM CLEANER NEW AEROSOL PET SPRAY • TICK AND FLEA SPRAY • KENNEL DUST.

FLORIDA VETERINARY LABORATORIES CO.
Division of Pet Chemicals, Inc.
1038 N. W. 21st Terrace, Miami, Florida

Veterinary Calendar

Jul. 21-23. **Canadian Veterinary Medical Association,** 10th Annual Convention. Royal Alexandra Hotel, Winnipeg, Manitoba. Dr. J. R. Singleton, 613 Dominion Public Building, Winnipeg 1, Manitoba, chairman.

Jul. 23-24. **Iowa State College,** Annual Conference for Veterinarians. Memorial Union, Iowa State College, Ames, Iowa. Dr. John B. Herrick, Ames, Iowa, extension veterinarian.

Aug. 10-12. **Mississippi State Veterinary Medical Association,** 52nd Annual Meeting. Buena Vista Hotel, Biloxi, Miss. Dr. J. W. Patterson, 221 Second Street, Columbia, Miss., in charge.

Aug. 18-21. **American Veterinary Medical Association,** 95th Annual Meeting. Municipal Auditorium. Philadelphia, Pa. Dr. J. G. Hardenbergh, 600 S. Michigan Ave., Chicago 5, Ill., executive secretary.

Sep. 4- 6. **New York State Veterinary Medical Society,** Annual Meeting. Concord Hotel, Kiamesha Lake, New York. Joan S. Halat, 803 Varick Street, acting executive secretary.

Sep. 8- 9. **New Mexico Veterinary Medical Association,** annual meeting. La Pasoda Hotel, Santa Fe, New Mexico. Dr. E. R. Leslie, 920 N. Main, Carlsbad, New Mexico, secretary.

Sep. 28-Oct. 1. **New England Veterinary Medical Association,** Annual Meeting. Dr. C. Lawrence Blackely, 180 Longwood Avenue, Boston 15, Mass., secretary-treasurer.

Oct. 8- 9. **Purdue University,** 46th Annual Short Course for Veterinarians. Purdue University, Agricultural Experiment Station, Lafayette, Ind. Dr. L. M. Hutchings, chairman.

Oct. 6- 7. **University of Missouri,** 34th Annual Short Course for Graduate Veterinarians. School of Veterinary Medicine, University of Missouri, Columbia, Mo. Dr. Cecil Elder, chairman.

Oct. 11. **Iowa State College Veterinary Homecoming Luncheon,** (11:00 A.M.). Veterinary Courtyard, Iowa State College, Ames, Iowa. Robert H. Keith, publicity.

Oct. 16-17. **Eastern Iowa Veterinary Medical Association,** Annual Meeting. Hotel Roosevelt, Cedar Rapids, Ia. Dr. F. E. Brutsman, Traer, Ia., secretary.

Oct. 26-29. **Southern Veterinary Medical Association.** Claridge Hotel, Memphis, Tennessee. Dr. A. A. Husman, Raleigh, North Carolina, secretary.

Nov. 4- 7. **United States Livestock Sanitary Association,** 62nd annual meeting. Hotel Deauville, Miami Beach, Florida. Dr. Ralph Hendershott, executive secretary.

Nov. 5- 6. **Mississippi Valley Veterinary Medical Association,** annual meeting. Pere Marquette Hotel, Peoria, Ill. Dr. W. P. Hendren, Carthage, Ill., secretary-treasurer.

Oct. 12-14. **Florida State Veterinary Medical Association,** annual meeting. Galt Ocean Mile Hotel, Ft. Lauderdale, Florida. Dr. A. R. Chambers, 6116 Main St., Jacksonville, Fla., secretary.

STRIKES

AT THE POINT OF

INTESTINAL INFECTION

FOR UNSURPASSED

OF

BACTERIAL DIARRHEAS AND ENTERITIS IN

LARGE AND SMALL ANIMALS

BIOSOL, an exceptionally versatile and potent antidiarrheal agent designed for easy preparation of economical, crystal clear, palatable solutions of the broad-spectrum antibiotic neomycin. Tailored specifically for herd, flock, kennel or individual treatment, Biosol is conveniently given in the drinking water, milk, feed, in gelatin capsules or as a drench.

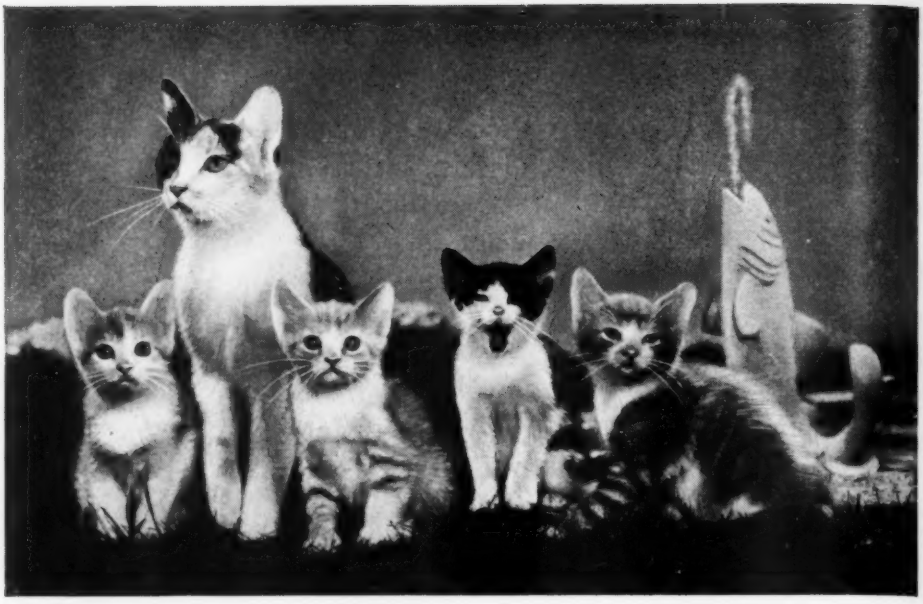
Only sparingly absorbed, Biosol assures positive and prompt antidiarrheal action where it is needed most — the site of infection — the gut. Its nontoxic and nonirritating properties make it particularly effective in treating stubborn bacterial diarrheas in very young or sick animals — useful in easily managed and stubborn cases.

Available in ½ lb. and 1 lb. bottles. Each pound contains neomycin base, 7 Gm. (present as neomycin sulfate commercial grade [not U.S.P.], approximately 17 Gm.).

ORAL
VETERINARY
BIOSOL
POWDER

*TRADEMARK, REG. U. S. PAT. OFF.

Upjohn Veterinary Division/THE UPJOHN COMPANY/Kalamazoo, Michigan



Puss 'n Boots gives complete nutrition — produces quick results

Whole-fish formula builds robust vigor in cats of all ages

It's good business to recommend Puss 'n Boots to your cat-owner clientele. Because this nutritious *whole-fish* formula delivers the kind of results owners appreciate. It supplies all the nutrients cats *of all ages* are known to need, makes dietary supplements unnecessary.

Puss 'n Boots contains all the natural life balance of whole fish—Nature's perfect cat food. It supplies abundant protein for strength and energy . . . calcium for sound teeth and strong bones . . . vitamins and minerals for soft, sleek fur. Tasty cereals are added for regularity, plus a bonus of extra Vitamin B_1 for appetite and good digestion.

Regular feeding of Puss 'n Boots can produce definite, noticeable results in just three weeks or less. Available at food and pet stores everywhere.

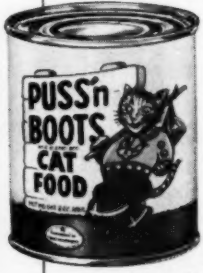
How the Natural Life Balance of WHOLE FISH Is Retained in Puss 'n Boots

Costly Fillets, rich in essential, high-quality proteins. Usually reserved for human consumption, retained in Puss 'n Boots.

Liver and Glands, for minerals and vitamins. Vital for health. Often extracted for medicinal use, but retained in Puss 'n Boots.

Bone Structure, for valuable calcium and phosphorus. Made crumbly and digestible and always retained in Puss 'n Boots.

Packed in 8-oz. and 15-oz. sizes.



PUSS 'n BOOTS

Fine quality makes it America's largest-selling cat food.

Coast Fisheries Division of The Quaker Oats Company, Chicago 54, Illinois

Now with

*Thorazine**

(Chlorpromazine, S. K. F.)

FOR VETERINARY USE ONLY

you can control pain,

excitement, vomiting... safely,

effectively in your practice... every day

Now available to veterinarians in these dosage forms:

2 cc. ampules containing 50 mg. 'Thorazine' in boxes of 6
Multiple dose vials (25 mg. per cc.) 10 cc. and 50 cc.
Tablets, 10 mg., in bottles of 50
Tablets, 25 mg., in bottles of 50 and 500

Pitman-Moore Company is
sole distributor of 'Thorazine'
to the Veterinary Profession

*T. M. Reg. U. S. Pat. Off., Smith, Kline & French Laboratories, Philadelphia.

PITMAN-MOORE COMPANY
DIVISION OF ALLIED LABORATORIES, INC., INDIANAPOLIS 6, INDIANA

AN IMPROVED

LaMotte-Trichinosis Antigen Emulsion

for the
Suessenguth-Kline Flocculation Slide Test

An antigen emulsion consisting of purified cholesterol crystals coated with a lyophilized trichinae larvae extract, prepared in the LaMotte Laboratories under the supervision of the authors.

LaMotte S-K Antigen Emulsion will retain its sensitivity for as long as 8 months if refrigerated.

Available in 1 cc. vials — immediate delivery.

Send for Bulletin SK-57 (VM)

LaMOTTE
CHEMICAL PRODUCTS COMPANY

Dept. VM Chestertown, Md.

Landrace Farrowing Champion

LM Ann, a registered Landrace sow, farrowed 54 pigs and raised 42 of them in 1957, it was reported by the American Landrace Association. In January, 16 pigs were farrowed; 12 were raised. In June, 21 were farrowed; 17 raised. In November, 17 were farrowed; 13 raised.

In two previous litters this sow farrowed 25 pigs and raised 24. This makes a total of 79 pigs farrowed, 66 of which were raised, all in five litters.

·VM·

During August 1957 considerable spread of epidemic Asian strain influenza occurred in Australia. Queensland was particularly affected. High industrial absenteeism was noted in some plants in this area. New South Wales and Victoria were also significantly affected. Through mid-August Victoria had experienced an estimated 100,000 cases. Western Australia also reported localized outbreaks.

New—for instantaneous use

LIQUAMYCIN*

OXYTETRACYCLINE SOLUTION

a sparkling-clear solution of the broad-spectrum antibiotic, oxytetracycline

The diversified conditions under which veterinary medicine is practiced call for a broad-spectrum antibiotic designed for rapid, systemic effect and offering the maximum in convenience, economy and versatility.

A 480 cc. LIQUAMYCIN bottle contains 12 grams of oxytetracycline in solution. Each cc. contains 25 mg. of oxytetracycline.

Convenient — A sparkling-clear, stable solution for easy and instantaneous administration. *Economical* — A therapeutic, systemic dose at minimum cost. *Versatile* — Oxytetracycline has an unsurpassed 8-year record of clinical success in a wide variety of infectious diseases.

*Trademark

Exclusive — Liquamycin is sold only to veterinarians.

Department of Veterinary Medicine
PFIZER LABORATORIES, *Division, Chas. Pfizer & Co., Inc.*, Brooklyn 6, N. Y.

Pfizer

LIFESPAN

formula diets

present

TWO NEW, LONG-NEEDED THOROUGHLY TESTED THERAPEUTIC DIETS

■ *For "senior" or aged pets*

LIFESPAN GERIATRIC DIET (Formula Diet #4)

The first complete diet especially formulated for old pets. To meet the problems of lowered metabolism, lessened appetite and activity, and tendencies to digestive disturbances and obesity, this diet features finest quality proteins; high levels of Vitamin B Complex (especially thiamine); adequate level of calcium; ample choline and inositol to assist fat metabolism. Nutritious, palatable, easily digestible, it will go far to ease the nutritional problems brought on by senility.

■ *For patients, boarders and finicky pets*

LIFESPAN GENERAL-PURPOSE CLINICAL DIET (Formula Diet #7)

Exceptionally palatable, highly nutritious and assimilable, and anti-diarrheic . . . a more than adequate, good, complete diet for hospitalized pets. It is designed to take the place of the many kinds of dog foods kept in hospitals to tempt the appetites of pets fed so many different diets at home. It will produce good stools during the hospital stay. It is a balanced diet with more than ample measure of the ten essential amino acids, vitamins, minerals and unsaturated fatty acids. An appetizing food, professionally formulated, which may be usefully prescribed for the "spoiled" dog or cat who presents a feeding problem.

Sold Only to or on Prescription of Graduate Veterinarians

7 LIFESPAN FORMULA DIETS

1. REDUCING DIET with Special Choline and Thiamine Supplements
2. LOW PROTEIN or Nephritic Diet
3. PUPPY, REPRODUCTION AND LACTATION DIET
4. GERIATRIC DIET
5. HIGH PROTEIN Gastro-Intestinal Diet
6. COMPLETE CAT DIET (Highly Palatable—Rich in Organ Animal Proteins—Low Ash.)
7. GENERAL PURPOSE CLINICAL DIET

PREPARED BY

FORMULA DIETS, INC.

70-10 74th Street, Middle Village 79, N. Y.

Territories still open for Ethical Veterinary Jobbers

FORMULA DIETS, Inc., 70-10 74th Street, Middle Village 79, N. Y.

Gentlemen:

Please send detailed literature on Lifespan Formula Diets

NAME_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

MY JOBBER IS_____

ADDRESS_____

The dangerous, disconcerting interruption in surgery can make the difference between success and failure for the veterinarian—life or death to the patient. And it's an extremely rare occurrence with a reliable, safe anesthetic like

short-acting

NEMBUTAL®

(Pentobarbital, Abbott)

Practicing veterinarians over a quarter century have learned to depend on the uniformity and purity of this short-acting anesthetic. When you use it, Doctor, you'll find—

Onset of action is prompt—surgical hypnosis being achieved in just 3 to 5 minutes from a single intravenous dose.

Degree of cerebral depression and duration of anesthesia are easily controlled, lasting from 45 to 90 minutes.

Optimal skeletal muscle relaxation accompanying NEMBUTAL anesthesia facilitates surgery; interruptions during procedures are rare.

Side effects are minimal with safe, easy-to-use NEMBUTAL; and there is little danger of cumulative effect with this short-acting agent.

Order safe, reliable, uniform NEMBUTAL from your Abbott representative, your distributor or from Veterinary Division, Abbott Laboratories, North Chicago, Illinois.

Abbott

6060P3

Deaths of Veterinarians

ARTHUR C. AMMANN, CVC '09; at Decatur, Ill., October 1955.

RUFUS M. BAILEY, TH '18, 60; practitioner at Goldsboro, N. Car.; at Wayne Memorial Hospital, Goldsboro, N. Car., Mar. 29, 1958.

HARRY C. BARTH, CVC '05; general practitioner; at Amboy, Ill., June 10, 1958.

CHARLES F. W. BAUER, ONT '13, 82; member A.V.M.A. and St. Louis District V.M.A.; general practitioner; at Florissant, Mo., Mar. 25, 1958.

ALVIN B. BINGHAM, OSU '19, 64; practitioner in Meigs County, Ohio 40 years; at Middleport, Ohio, Mar. 3, 1958.

PERRY O. BONHAM, IND '11, 67; retired practitioner and horse trainer; at Indianapolis, Ind., Mar. 17, 1958.

ALVIN H. BURRIS, 95, retired practitioner; at Woodridge, Conn., Mar. 7, 1958.

FRANK A. DOLTON, CVC '96, at Mundelein, Ill., Aug. 25, 1956.

ANDREW E. DONOVAN, SF '02, 81; retired veteran of the Army Veterinary Corps where he attained the rank of colonel; at Naval Hospital, Chelsea, Mass., Mar. 3, 1958.

ARTHUR E. FABIAN, CVC '08; at Lake Geneva, Wisc., Jan. 31, 1958.

LEONARD W. GOSS, OSU '05, 80; member A.V.M.A.; retired professor of veterinary pathology at Ohio State University; of a heart ailment at Winterhaven, Fla., Apr. 2, 1958.

THOMAS W. HEALEY, CVC '06, 87; member A.V.M.A.; retired after 51 years active practice; at San Jose, Calif., Feb. 11, 1958.

HARRY C. INGRAHAM, KCV '14, 72; retired after serving with A.R.S., USDA; at Kansas City, Kans., March 1958.

HOWARD A. JANSSEN, WSC '42, 38; member A.V.M.A.; active in professional and civic activities, particularly Boy Scout work; at Oakdale, Calif., Mar. 27, 1958.

GEORGE R. H. KAUFFMAN, UP '13, 67; at Reading, Penna., recently.

JOHN E. KELLBERG, UP '35, Chicago, Ill., 1953.

WILLIAM O. KER, UP '42, 39; at Philadelphia, Penna., recently.

CLAUDE E. PAGE, IND '12, 72; at Carlisle, Ind., February 1958.

GEORGE W. PEDIGO, CVC '10, 71; member A.V.M.A. and Kentucky V.M.A.; active in civic and professional affairs, formerly president of his state association; at Glasgow, Ky, Mar. 26, 1958.

GEORGE B. SCHUEY, ONT '10, 72; at Wilkinsburg, Penna., recently.

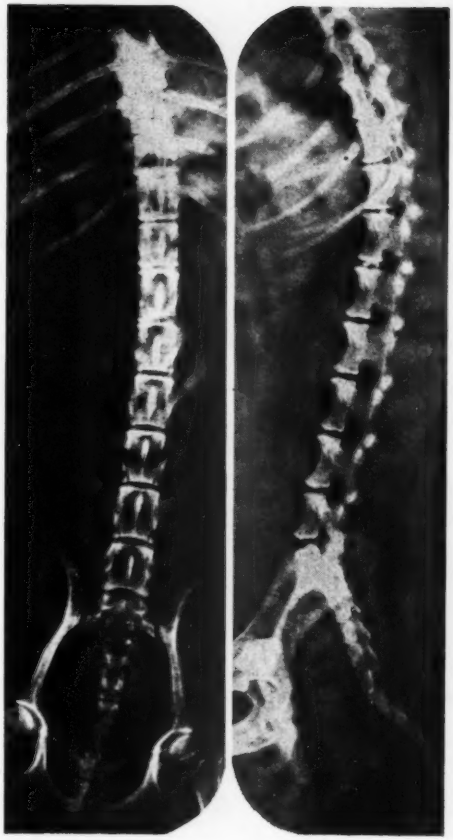
DOYCE D. SMITH, OKL '51, 32; member A.V.M.A. and Oklahoma V.M.A.; general practitioner; following abdominal surgery at Cherokee, Okla., Mar. 30, 1958.

ARTHUR C. SPIVEY, IND '12, 79; member A.V.M.A.; retired practitioner and superintendent of a biologic house; at Carmel, Ind., Mar. 17, 1958.

CECIL H. STEVENS, UP '11, 82; Montana state veterinarian for 39 years; at Wyalusing, Penna., Mar. 26, 1958.

BOYD TUCKER, TEX '41; member A.V.M.A. and Indiana V.M.A.; small animal practitioner; at Evansville, Ind., May 22, 1958.

HARVEY N. UMBSTAETTER, UP '17, 66; member of Ohio and Lorain County V.M.A.'s; practitioner since 1929; at Amherst, Ohio, Mar. 17, 1958.



How would YOU diagnose this?

CASE NO. 3 The ventro-dorsal radiograph of the patients spine shows a narrowing of intervertebral disc spaces T 13 and L-1 with a calcification of discs L 1-2 and L 2-3.

The lateral view shows similar changes and also exhibits ventral spurs at T 13-L 1, L 1-2 and L 4-5. Diagnosis: Acute intervertebral disc syndrome with prolapse of disc T 13-L 1 and early spondylitis deformans.

Treatment of choice in such a case is Butazolidin® (Veterinary)*. One tablet (100 mg. each) per 5 lb. body weight daily in three divided doses, quickly relieves pain and inflammation associated with posterior paralysis and arthritic lameness. Order Butazolidin today. Rely on it in your practice.

*brand of phenylbutazone U. S. Pat. No. 2,562,830 under license from Geigy Chemical Corporation

Jensen-Salsbery Laboratories, Inc.
Kansas City, Missouri

Jen-Sal

see X-ray, inside front cover, Small Animal Practice

Quadramycin

with lomycin—specific affinity for mammary tissue

New intramammary infusion contains 4 antibiotics for vastly improved mastitis therapy

QUADRAMYCIN is an entirely new intramammary infusion containing **four** antibiotics . . . lomycin (DiethylaminoethylesterpenicillinGhydriodide with dihydrostreptomycin), polymixin B sulfate and neomycin—each with a specialized function, the combination of which provides an exclusive professional formula for effective mastitis therapy.

QUADRAMYCIN features lomycin—the remarkable antibiotic that provides prolonged bactericidal activity . . . **plus** up to 5 times more udder tissue concentration than procaine penicillin G.

Each 12 cc. QUADRAMYCIN syringe contains:

Diethylaminoethylesterpenicillin G-hydriodide 100,000 units

Dihydrostreptomycin (base as sulfate) 100 mg.

Polymixin B sulfate, 50,000 units

Neomycin base (as sulfate) 100 mg.

in special diffusible base

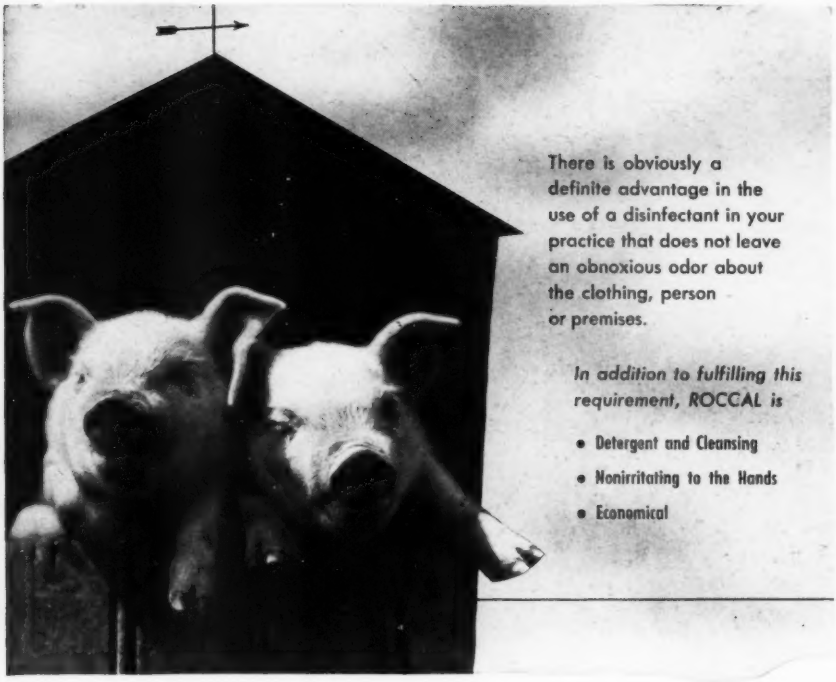
Supplied in: Attractive display cartons containing 12 individually boxed plastic disposable syringes—each syringe box with direction label under removable formula flap.

Norden®

NORDEN LABORATORIES
Lincoln, Nebraska

Products of research for veterinarians exclusively.

New QUADRAMYCIN



There is obviously a definite advantage in the use of a disinfectant in your practice that does not leave an obnoxious odor about the clothing, person or premises.

In addition to fulfilling this requirement, ROCCAL is

- Detergent and Cleansing
- Nonirritating to the Hands
- Economical

DEPENDABLE DISINFECTANT

Wide Range of Usefulness

ROCCAL is eminently useful as a germicide. It is not for surgical use but is intended for the general disinfection of floors, walls, kennels, stables, milking equipment, operating tables, furniture, wash tubs, eating and drinking utensils.

ROCCAL 10% SOLUTION supplied in 1 pint, 1 quart and 1 gallon bottles.
ROCCAL 50% SOLUTION supplied in 5 gallon containers.

informative data sent on request

ROCCAL®

DEPENDABLE DISINFECTANT

Roccal, trademark reg. U.S. Pat. Off., brand of sanitizing agent (active ingredient—benzalkonium chloride, technical, 10%; inert ingredients, 90%).

Winthrop LABORATORIES NEW YORK 18, N.Y. • WINDSOR, ONT.

Even in this day of wonder drugs . . .

bacterins fill as definite a need as they did a generation ago. Preventive vaccination continues to protect animals for extended periods of time, often for life. For dispensing and for practice use, CSL bacterins are favorably received by veterinarians who know their reputation for potency and general biological excellence.

Clostridium Chauvei-Septicus Pasteurella Bacterin

Clostridium Chauvei-Septicus Bacterin

Blackleg Bacterin

Clostridium Perfringens Type C Toxoid and Antitoxin

Clostridium Perfringens Type D Bacterin and Antitoxin

Specific Mixed Bacterins

CSL

CORN STATES LABORATORIES, INC.

1124 HARNEY STREET • OMAHA 2, NEBRASKA